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DISPOSAL OF HOMO NALEDI

DEATHTRAP OR MASS MORTALITY SCENARIO?

THE IRREDUCIBLY COMPLEX

RIBOSOME

SEARCHING FOR
SODOM

HOW DARWINISM FOSTERS
MORAL DECLINE

SCANDINAVIAN AND BRITISH-IRISH ICE SHEET
CONUNDRUM



JOURNAL OF CREATION

An international journal devoted to the presentation and discussion of technical aspects of the sciences such as geology, biology, astronomy, etc., and also geography, archaeology, biblical history, philosophy, etc., as they relate to the study of biblical creation and Noah's Flood.

COVER: Grey Glacier, in the Southern Patagonian Ice Field, Chile

IMAGE: pixabay.com

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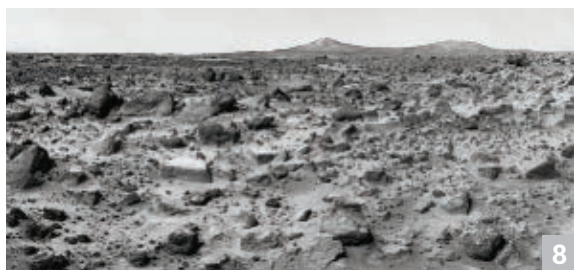
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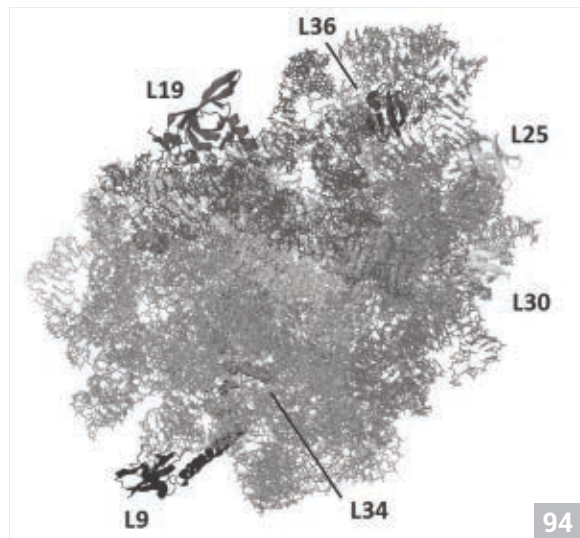


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The ribosome of all three domains, Archaea, Bacteria, and Eukarya, has been created uniquely.

ABOUT US

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- » The account of origins presented in Genesis is a simple but factual presentation of actual

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- » The great Flood of Genesis was an actual historic event, worldwide (global) in its extent and effect.
- » The special creation of Adam (as one man) and Eve (as one woman) and their subsequent fall into sin, is the basis for the necessity of salvation for mankind (and thus for the Gospel of Jesus Christ).
- » The scientific aspects of creation are important, but are secondary in importance to the proclamation of the Gospel of Jesus Christ as Sovereign, Creator, Redeemer and Judge.

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Fossil time ranges continue to expand up and down

Michael J. Oard

For the last few decades, several creationists have been reporting on the vertical expansion of fossil ranges, interpreted as either ‘older’ or ‘younger’ in the geological column timescale. These finds are probably the tip of the iceberg, since we cannot go through all the relevant journals that would report range expansions. In fact, many of these issues likely go unreported because many ‘anomalous’ or ‘uninteresting’ fossils end up in the back shelves of museum collections, as Dr Carl Werner has discovered.¹ As such, it is hard to know just how large the scale of this phenomenon is, though it is almost certainly more severe than reported in any literature, secular or creationist.

Some range expansions are quite large, such as moving the time boundaries by 50 to 100 Ma or more. Some examples are: the pushing back of eukaryote evolution one billion years;² the discovery of grass in dinosaur dung from the Mesozoic;³ ‘sophisticated’, diverse mammals now found in the Mesozoic;⁴ and the origin of flowering plants may have been pushed back 100 Ma.^{5,6} Moreover, organisms that were thought to be extinct for many millions of years are found to be living, such as the Wollemi pine found alive in New South Wales, Australia.⁷ Archaeological discoveries also contribute to the range expansions by indicating man was always smart, making it less likely he evolved.⁸

Many of these range expansions are not considered too significant, being only a matter of millions of years or from a fossil that is not used

as an index fossil. Nonetheless, it still indicates that the fossil record is not precisely timed as evolutionists often make it out to be. Moreover, it accentuates the problem of stasis, revealing the *ad hoc* nature of much evolutionary storytelling about the fossils. Essentially, it shows that evolution and deep time act more as assumptions constraining their

interpretation of the fossil record than as conclusions they draw from the fossil record.

Origin of snakes pushed back 70 Ma

One of the most significant new discoveries is snake fossils that are 70 Ma older than scientists expected.



Figure 1. A rare, New World brown spider monkey, *Ateles hybridus*, from Venezuela, northwest South America

This date pushes snakes back to the Middle Jurassic.^{9,10} A variety of snake fossils were found in four countries, suggesting an ‘origin’ many millions of years earlier.

New World monkeys pushed back 10 Ma

The New World monkeys are found alive today in South and Central America and on the Caribbean islands (figure 1). Evolutionists believe they originated from Africa. Creationists believe their ancestors came off the Ark and spread to South America after the Flood. New research pushes back their fossil record in South America by 10 Ma to the late Eocene.¹¹ Evolutionists have mostly come to believe the New World monkeys arrived from Africa on vegetation.^{11,12} One problem for them is that the vegetation rafts observed today are quite small.

Sophisticated mammal traits continue to be pushed down into the Middle Jurassic

Sophisticated mammal fossils have been pushed back to the Middle Jurassic of the Mesozoic. Evolutionists used to claim that the Mesozoic had only rat-like mammals. But fossils that display other mammal traits are also being found in the Middle Jurassic. New fossils found in China push the climbing locomotor adaptation of mammals back to the Middle Jurassic.¹³ This deduction is based on the skeletal properties. It is admitted that numerous mammal traits ‘evolved’ early and independently.¹⁴ Of course, all this mammal evolution is attributed to ‘convergent evolution’. The evolution of sophisticated mammals is now compressed into a very short time. This points more to special creation than evolution which needs much time.

Well-preserved ostracods back 25 Ma earlier in Ordovician

Ostracods are small crustaceans, and are the most abundant arthropods in the fossil record. They were thought to be older than the Silurian, but the fossil record did not show any in the Ordovician. But now it is ‘certain’ since they have found fossils in the late Ordovician, extending the knowledge of well-preserved ostracods back 25 Ma.¹⁵ Amazingly even some soft parts are preserved.

This may seem like a successful evolutionary prediction. However, from a biblical perspective, the fossil record is already expected to preserve only a general order, so even such ‘expected’ range extensions are perfectly consistent with a biblical view of the fossil record. Moreover, when seen against the general trend of unexpected range extensions, the prediction is far less impressive, and itself still open to future revision.

A possible type of amniote pushed back from Late Triassic to Middle Triassic

Teeth and jaws from an enigmatic taxon, probably one of the Amniota—reptiles, birds, and mammals—was pushed back from the Late Triassic in the US to the Middle Triassic in Germany.¹⁶

Earliest modern bandicoot and bilby pushed back 5 to 10 Ma

Bandicoots and bilbys are small marsupials living in Australia. The earliest fossils were ‘dated’ Pliocene until they were recently found in the middle Miocene of the Riversleigh World Heritage area of north-west Queensland, Australia.¹⁷ These are likely post-Flood marsupials that arrived in Australia. It does not nullify the idea that the Flood/post-Flood boundary is in the late Cenozoic,

since the Miocene is late Cenozoic.¹⁸ We cannot rely on uniformitarian dating methods to determine the boundary, which can be Miocene in one location and even middle Pleistocene in another location.¹⁹

Whale echolocation pushed back

Whale echolocation works like sonar and is extremely sophisticated. Evolutionists consider that it took a long time for the complex behaviour and anatomy to evolve after whales first evolved. However, a fossil from the Oligocene, about 28 Ma ago, shows features indicative of echolocation.²⁰ The researchers conclude:

“... that a rudimentary form of echolocation evolved in the early Oligocene, shortly after odontocetes [toothed whales] diverged from the ancestors of the filter-feeding whales (mysticetes).”²¹

So whales had echolocation right from the beginning. Maybe echolocation and whales did not evolve, although the researchers couch the remarkable discovery in evolutionary terms by claiming that the echolocation was ‘rudimentary’, although they give no reasons why they make this claim. How can it be rudimentary? It either works or it doesn’t. The bones show the evidence of echolocation, and the echolocation is considered rudimentary likely because of the early date of the fossil.

A type of bird pushed back 5 to 6 Ma

A large category of birds is called Ornithuromorpha. Many are extinct but the category also includes all living birds. Fossils of this bird type are found in the famous Jehol Biota in China where half the diversity of Mesozoic birds is found. This type of bird has recently been found in a lower formation within the Jehol Biota,

pushing Ornithomomorpha back 5 to 6 Ma.²² This may seem insignificant, but in many cases the extensions are changing ‘inch by inch’. Over a longer period of investigation, these extensions add up and show how the fossil record looks less and less like a time series.

Dinosaur footprints push origins back around 20 Ma

It has been widely taught that dinosaurs evolved about 230 Ma ago. But there are now dinosaur tracks that date back to around 250 Ma ago, right after the massive ‘Permian extinction’.²³ It is interesting that these tracks are quadrupedal, while the earliest dinosaurs are thought to have been bipedal.

Origin of pterodactyls pushed back over 5 Ma

A new pterodactyl fossil has been discovered in north-west China.^{24,25} It pushes the origin of pterodactyls back by more than 5 Ma.

Two new living fossils

Two new living fossils have been discovered. A certain dinoflagellate was thought extinct in at least the Atlantic Ocean in the early Pleistocene, but has been discovered recently in a warm pool in the western Pacific and Indian Oceans.²⁶ A marine worm from the Northern Hemisphere, called *Protuliphila*, was thought extinct 4 Ma ago, but has been found alive and well near Picton, New Zealand.²⁷

Conclusion

These fossil range expansions show that a precise fossil order is not yet established. When fossils are found older than expected, it shows that stasis is the predominant pattern

in the fossil record, which evolution does not predict, considering that some organisms have supposedly evolved rapidly from primitive primates to humans while others have stayed essentially identical for the same period of time. In some cases, it can also show there was little time for them to ‘evolve’ and they change very little afterwards. Living fossils challenge evolution and uniformitarianism because there are often vast time gaps between their last appearances and the present. This pattern of stasis and increased ranges is however perfectly consistent with seeing the fossil record as a general burial order in a single cataclysm like Noah’s Flood.

References

- Werner, C., *Living Fossils—Evolution: The Grand Experiment*, vol. 2, New Leaf Press, Green Forest, AR.
- Oard, M.J., Supposed eukaryote evolution pushed back one billion years, *J. Creation* 15(1): 4, 2001.
- Oard, M.J., The origin of grass pushed well back into the ‘Mesozoic’, *J. Creation* 21(1):9, 2007.
- Oard, M.J., Jurassic mammals—more surprisingly diverse, *J. Creation* 21(2):10–11, 2007.
- Batten, D., Pollen problems, *Creation* 36(2):54, 2014.
- Oard, M.J., Fossil time ranges continue to be increased, *J. Creation* 28(3):3–4, 2014.
- Wieland, C., Sensational Australian tree ... like ‘finding a live dinosaur’, *Creation* 17(2):13, 1995.
- Oard, M.J., Post-Flood man continues to become smarter, *J. Creation* 27(3):3, 2013.
- Caldwell, M.W., Nydam, R.L., Palci, A., and Apesteguia, S., The oldest known snakes from the Middle Jurassic–Lower Cretaceous provide insights on snake evolution, *Nature communications* 6: 27, January 2015; doi:10.1038/ncomms 6996.
- Bell, P., Standard snake evolution story stymied by spate of fossil discoveries, *J. Creation* 29(3): 8–10, 2015.
- Bond, M., Tejedor, M.F., Campbell Jr, K.E., Chornogubsky, L., Novo, N., and Goin, F., Eocene primates of South America and the African origin of New World monkeys, *Nature* 520:538–541, 2015.
- De Queiroz, A., *The Monkey’s Voyage: How Improbable Journeys Shaped the History of Life*, Basic Books, New York, 2014.
- Meng, Q.-J., Ji, Q., Zhang, Y.-G., Liu, D., Grossnickle, D.M., and Luo, Z.-X., An arboreal docodont from the Jurassic and mammalianform ecological diversification, *Science* 347:764–768, 2015.
- Martin, T., Marugán-Lubón, J., Vullo, R., Martín-Abad, H., Luo, Z.-X., and Buscalioni, A.D., A cretaceous eutriconodont and integument evolution in early mammals, *Nature* 526: 380–384, 2015.
- Siveter, D.J., Tanaka, G., Farrell, U.C., Martin, M.J., Siveter, D.J., and Briggs, D.E.G., Exceptionally preserved 450-million-year-old Ordovician ostracods with brood care, *Current Biology* 24:801–806, 2014.
- Sues, H.-D. and Schoch, R.R., First record of *Colognathus* (?Amniota) from the Middle Triassic of Europe, *J. Vertebrate Paleontology* 33(4): 998–1002, 2013.
- Travouillon, K.J., Hand, S.J., Archer, M., and Black, K.H., Earliest modern bandicoot and bilby (marsupialia, peramelidae, and thylacomyidae) from the Miocene of the Riversleigh World Heritage area, northwestern Queensland, Australia, *J. Vertebrate Paleontology* 34(2):375–382, 2014.
- Oard, M.J., (ebook). *The Flood/Post-Flood Boundary Is in the Late Cenozoic with Little Post-Flood Catastrophism*, 2014; michael.oards.net/PostFloodBoundary.htm.
- Oard, M.J., Relating the Lava Creek ash to the post-Flood boundary, *J. Creation* 28(1):104–113, 2014.
- Geisler, J.H., Colbert, M.W., and Carew, J.L., A new fossil species supports an early origin for toothed whale echolocation, *Nature* 508: 383–386, 2014.
- Geisler et al., ref. 20, p. 383.
- Wang, M., Zheng, X., O’Connor, J.K., Lloyd, G.T., Wang, X., Wang, Y., Zhang, X., and Zhou, Z., The oldest record of ornithomomorpha from the early Cretaceous of China, *Nature Communications* 6:6987, 2015; doi:10.1038/ncomms7987.
- Brussatte, S.L., Niedzwiedzki, G., and Butler, R.J., Footprints pull origin and diversification of dinosaur stem lineage deep into Early Triassic, *Proceedings of the Royal Society B* 278: 1107–1113, 2011.
- Andres, B., Clark, J., and Xu, X., The earliest pterodactylid and the origin of the group, *Current Biology* 24:1011–1016, 2014.
- Rosen, M., Oldest flying reptile, *Science News* 185(11):5, 2014.
- Mertens, K.N., Takano, Y., Head, M.J., and Matsuoka, K., Living fossils in the Indo-Pacific warm pool: a refuge for thermophilic dinoflagellates during glaciations, *Geology* 42(6): 531–534, 2014.
- Gordon, D., Northern-hemisphere fossil discovered living in New Zealand, niwa.co.nz/news/northern-hemisphere-fossil-discovered-living-in-new-zealand, 29 May 2014.

The problem with science is that so much of it simply isn't

John G. Hartnett

In the opening sentence in an article titled “Scientific Regress”, the author William Wilson remarks:

“Scientific claims rest on the idea that experiments repeated under nearly identical conditions ought to yield approximately the same results, but until very recently, very few had bothered to check in a systematic way whether this was actually the case.”¹

The article is about science and the repeatability of scientific results published in the peer-reviewed scientific literature. (Indented paragraphs are quoted from this article, unless otherwise referenced.)

Claims not replicated

A group called Open Science Collaboration (OSC) tried to evaluate research claims by replicating results of certain science experiments. They replicated one hundred published psychology experiments and found 65% failed to show any statistical significance, and many of the remainder showed greatly reduced significance than originally reported. The OSC group even used original experimental materials and sometimes performed the experiments under the guidance of the original researchers.

They found, though, that the problem was not just in the area of psychology, which I don't consider hard science anyway.

In 2011 a group of researchers at Bayer looked at 67 recent drug discovery projects based on preclinical cancer biology research. They found

that in more than 75% of cases they could not replicate the published data. These data were published in reputable journals, including *Science*, *Nature*, and *Cell*.

The author suggested that the reason many new drugs were ineffective may be because the research on which they were based was invalid. This was considered the reason for the failure—the original findings were false.

Then there is the issue of fraud.

“In a survey of two thousand research psychologists conducted in 2011, over half of those surveyed admitted outright to selectively reporting those experiments which gave the result they were after.”

This involves experimenter bias. The success of a research program might be all that is required for success in the next funding round. So, what might start as just a character weakness in the experimenter ends up being outright fraud. The article states that many have no qualms in

“... reporting that a result was statistically significant when it was not, or deciding between two different data analysis techniques after looking at the results of each and choosing the more favorable.”

One writer

“... theorized that the farther from physics one gets, the more freedom creeps into one's experimental methodology, and *the fewer constraints there are on a scientist's conscious and unconscious biases*. If all scientists were constantly attempting to influence the results of their analyses, but had more opportunities to do so the ‘softer’ the science, then we might expect that the social sciences have more papers that confirm a sought-after hypothesis than do the physical sciences, with medicine and biology somewhere in the middle. This is exactly what the study discovered: A paper in psychology or psychiatry is about five times as likely to

report a positive result as one in astrophysics [emphasis added].”

Retracted claims in the hard sciences

I work in the field of physics (experimental and theoretical). I know first hand about the pressure to publish findings. I believe it is more difficult to commit fraud in physics but I also believe there exist opportunities to do so, particularly in areas that are difficult to check. An example is where there is a heavy content of theoretical physics, and/or where statistical analyses are critical to the finding. Detection problems arise in areas such as particle and astrophysics.

Two major claims have recently been retracted.

One was the announced discovery of both cosmic inflation and gravitational waves at the BICEP2 experiment in Antarctica, which I covered extensively in 2014/15.² It was retracted only about one year after the initial announcement. In 2011 there was the reporting of an alleged discovery of superluminal neutrinos at the Swiss–Italian border, which, as is typical, was later retracted with far less fanfare than when first published. This situation involved an OPERA experiment in which neutrinos supposedly travelling faster than light were observed. A year after the OPERA claim, the co-located ICARUS experiment reported neutrino velocities consistent with the speed of light in the same short-pulse beam OPERA had measured.

In both cases, in which physics was central, independent measurements were able to check the validity of the initial claim. This, thankfully, occurs far more often in the hard sciences than other science fields. Sometimes a false hypothesis endures for a time, but eventually is overturned. Unfortunately, this is often not the case with the ‘softer sciences’, if they can be called that.



Figure 1. BICEP2 telescope at the South Pole

Evolutionary biology masquerades as hard science

So-called evolutionary biology, for example, masquerades as a hard science when, in fact, much of it is not operational science. Operational science is testable and repeatable, is open to criticism and subject to fraud detection. After all, *science without debate is propaganda!*

But evolutionary so-called science, is more like forensic science; it is weak because it is not subject to the same testable criteria.

As the famous evolutionary biologist Ernst Mayr admitted:

“For example, Darwin introduced historicity into science. Evolutionary biology, in contrast with physics and chemistry, is a historical science—the evolutionist attempts to explain events and processes that have already taken place. Laws and experiments are inappropriate techniques for the explication of such events and processes. Instead one constructs a historical narrative, consisting of a tentative reconstruction of the particular scenario that led to the events one is trying to explain.”³

In such a science, experimentation is not applicable,⁴ but story-telling,

which Stephen Gould called just-so-stories, is.

The article goes on to criticize the inane processes of scientific paper publication, peer-review, and the difficulties in getting false notions overturned, as well of the development of the cult of ‘scientism’:

“Some of the Cult’s leaders like to play dress-up as scientists—Bill Nye and Neil deGrasse Tyson are two particularly prominent examples—but hardly any of them have contributed any research results of note. Rather, Cult leadership trends heavily in the direction of educators, popularizers, and journalists.”

These criticisms I mostly agree with, but the article was not explicit on the underlying Darwinian belief system prevalent today.

Conclusion

That belief system—materialism, that matter, energy, and the forces of nature are all that there is—is prevalent in the scientific community. It has led to a *modern-day bias of atheism among the scientific establishment* to the point that anyone holding to a Judeo-Christian belief system must be considered weak. Darwinian evolution and big bang atheism are the

accepted beliefs on which all science is to be based. This is the worldview now held in most universities in the West. This fact has led to a moral vacuum and a situation where fraud has become more commonplace.

This has progressively established a trend as society, more and more, has abandoned the Creator. The author concludes his article with the following, which I must agree with:

“When cultural trends attempt to render science a sort of religion-less clericalism, scientists are apt to forget that they are made of the same crooked timber as the rest of humanity and will necessarily imperil the work that they do. The greatest friends of the Cult of Science are the worst enemies of science’s actual practice.”

References

1. Wilson, W.A., Scientific Regress, First Things, Institute of Religion and Public Life, firstthings.com/article/2016/05/scientific-regress, May 2016.
2. Hartnett, J.G., New study confirms BICEP2 detection of cosmic inflation wrong, February, 2015; creation.com/detection-of-cosmic-inflation-wrong.
3. Mayr, Ernst (1904–2005), Darwin’s Influence on Modern Thought, based on a lecture that Mayr delivered in Stockholm on receiving the Crafoord Prize from the Royal Swedish Academy of Science, 23 September 1999; published on ScientificAmerican.com, 24 November 2009.
4. This will be denied. The evolutionist will claim experiments in the lab confirm evolution. But it is equivocation, where the definition of evolution is changed. In the lab it is natural selection operating on mutating genes, but for a microbe to evolve into a microbiologist over 3.8 billion years a lot of new information would have to have been added, and lab experiments have done nothing to confirm this.

What is the origin of Martian floods?

Michael J. Oard

The evidence for floods on the planet Mars is substantial,¹⁻³ and they are often described in detail with superlatives:

“Outflow channels represent the largest system carved by liquid water on Mars. They are thousands of kilometers long, more than a kilometer deep (Baker, 2001) and show attributes such as grooves, terraces, teardrop islands, streamlined terraces and high width-to-depth ratios that are consistent with the erosive origin of the channels.”⁴

Some scientists further claim they have found additional evidence of precipitation, lakes, and glaciation.⁵

Many of the features on Mars are similar to the features of catastrophic flow created by the Lake Missoula flood in the northwest United States.⁶

However, the Martian catastrophic flow channels (figure 1) are orders of magnitude larger than those of the Lake Missoula flood. The estimated amount of water released from one location on Mars, Aram Chaos, is 93,000 km³, while the volume of glacial Lake Missoula is estimated at 2,000 km³. The flood volume on Mars is said to be 10 to 100 times larger than the largest catastrophic floods on Earth, not including Noah’s Flood, which most scientists do not recognize.⁷ Figure 2 shows a picture of the flood debris on the ground from the Mars Pathfinder.

Floods mostly from ‘chaos’ regions

Scientists appear to have reached a consensus as to the origin of the water for the Martian floods. They conclude that it erupted from below the ground, with most researchers believing the water originated from ‘chaos regions’.^{8,9} These regions are large collapse features seen by satellite. The regions have an irregular fracture

pattern on a scale of tens to hundreds of kilometres, and have tilted, flat-topped blocks tens of kilometres in diameter. The blocks form depressions in the landscape hundreds of metres deep. The chaos regions also have a convoluted network of mesas, buttes, and hills, chopped through with valleys. Nothing like this exists on Earth.

Aram Chaos is hundreds of kilometers long with a large-scale collapse of about 1,500 m. The researchers suggest that long ago a large underground reservoir burst. Most of the chaos regions are found in the northern highlands, and it appears the issuing water rushed down the steep slopes of the crustal dichotomy into the northern lowland, forming the immense water-carved channels.

What caused the floods?

It is unknown what caused the ‘chaos regions’ to expel such a huge volume of water quickly, but there are many ideas,¹⁰ including meteorite impacts, the rise of magma, volcanic eruptions, and tectonic activity. Judging from the size of the chaos regions and the outflow channels, the resultant floods were spectacular, so the cause must have been equally spectacular. Secular scientists are not able to reach any conclusion regarding the number and duration of the floods or the dates of the floods. Because they rely on crater counting as a relative age indicator, they spread the occurrence of floods from the chaos regions over a time period from 3.8 Ga to 2.0 Ga or younger.¹¹ One ingenious, but speculative, hypothesis claims that the water collected in basin sediments, sometimes deposited in impact craters, during the so-called Late Noachian (not to be confused with Noah’s Flood on Earth), about 3.7 Ga but that it did not cause floods until the late Hesperian, about 2.5 Ga.¹²

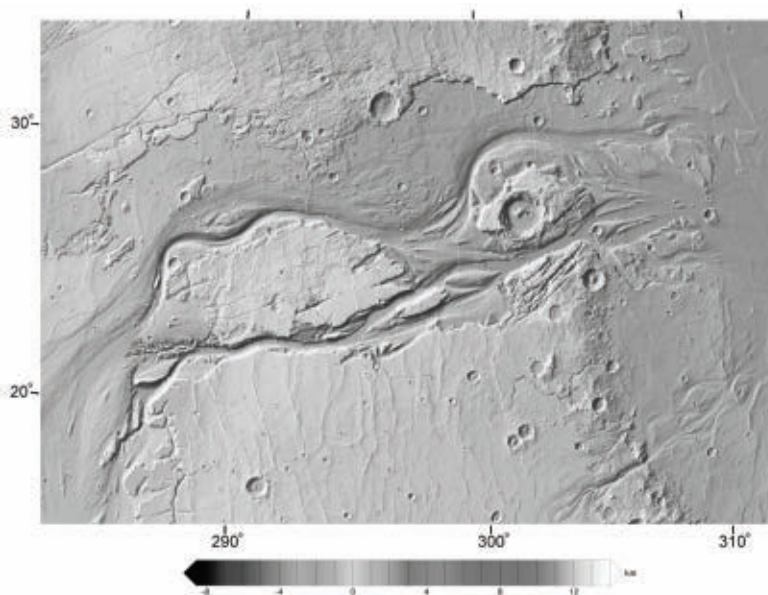


Figure 1. Kasei Valles, seen in MOLA elevation data. Flow was from bottom left to right. North is up. Image is approximately 1,600 km across, showing the enormous size of this channel, which is 3,500 km long, greater than 400 km wide, and exceeds a depth of 2.5 km (Areong, NASA).



Figure 2. Mars Pathfinder photo of region where Ares Vallis borders Chryse showing flood debris (NASA/JPL)

If meteorite impacts broke open underground reservoirs,^{13,14} it could have caused a massive flood. The fact that Aram Chaos is found inside an impact crater adds credibility to this hypothesis. An alternative possibility is that the heat of an impact melted ground ice. Meteorite impacts could also explain the evidence for precipitation and glaciers as produced by water vapour from impacts.

Timing of the floods

The impact idea is not popular. One reason why this uniformitarian proposal falls short is that they spread the thousands of Martian impacts over hundreds of millions or even billions of years. There are several planetary scientists who try to focus a large number into more specific time periods so they would produce more powerful floods.

Spreading the time out to billions of years means each flood would be isolated and mediocre. However, if they came all at once, at the same time as the Genesis Flood on Earth,^{15,16} a huge number of impacts would fall in quick succession. The bombardment would cause a great amount of heat

to rapidly pass into the subsurface. It would be the right order of magnitude to release a prodigious amount of underground water. With such a meteorite bombardment, the crater-counting dates proposed by secular scientists would become virtually meaningless, since by chance some areas would have many impacts, dated ‘old’, and some areas with few impacts, dated ‘young’. Meteorite bombardment over a short period of time would be a much more powerful mechanism for the release of ground water and precipitation than the isolated impacts proposed by secular geologists.

References

1. Baker, V.R., Water and the martial landscape, *Nature* **412**:228–236, 2001.
2. Carr, M.H., The fluvial history of Mars, *Philosophical Transactions of the Royal Society A* **370**:2193–2215, 2012.
3. Sarfati, J., Mars: the red planet, *Creation* **32**(2):38–41, 2010; creation.com/mars-red-planet.
4. Roda, M., Kleinhans, M.G., Zegers, T.E., and Oosthoek, J.H.P., Catastrophic ice lake collapse in Aram Chaos, Mars, *Icarus* **236**: 104–121, 2014.
5. Hubbard, B., Milliken, R.E., Kargel, J.S., Limaye, A., and Souness, C., Geomorphological characterisation and interpretation of a mid-latitude glacial-like form: Hellas Planitia, Mars, *Icarus* **211**:330–346, 2011.
6. Oard, M.J., *The Missoula Flood Controversy and the Genesis Flood*, Creation Research Society Books, Chino Valley, AZ, 2004.
7. Komatsu, G. and Baker, V.R., Paleohydrology and flood geomorphology of Ares Vallis, *J. Geophysical Research* **102**(E2):4151–4160, 1997.
8. Warner, N.H., Gupta, S., Kim, J.-R., Lin, S.-Y., and Muller, J.-P., Retreat of a giant cataract in a long-lived (3.7–2.6Ga) martian outflow channel, *Geology* **38**(9):791–794, 2010.
9. Zegers, T.E., Oosthoek, J.H.P., Rossi, A.P., Lom, J.E., and Schumacher, S., Melt and collapse of buried water ice: an alternative hypothesis for the formation of chaotic terrains on Mars, *Earth and Planetary Science Letters* **297**:496–504, 2010.
10. Spencer, W., Mars’ catastrophic past, *J. Creation* **22**(2):10–11, 2008.
11. Fassett, C.I. and Head III, J.W., The timing of martian valley network activity: constraints from buffered crater counting, *Icarus* **195**:61–89, 2008.
12. Rodriguez, J.A.P., Kargel, J.S., Baker, V.R., Gulick, V.C., Berman, D.C., Fairén, A.G., Linares, R., Zarroca, M., Yan, J., Miyamoto, H., and Glines, N., Martian outflow channels: how did their course aquifers form, and why did they drain so rapidly? *Scientific Reports* **5**(13404): 1–9, 2015.
13. Wang, C-y, Manga, M., and Wong, A., Floods on Mars released from groundwater by impact, *Icarus* **175**:551–555, 2005.
14. Toon, O.B., Segura, T., and Zahnle, K., The formation of martian river valleys by impacts, *Annual Review of Earth and Planetary Science* **38**: 303–302, 2010.
15. Oard, M.J., How many impact craters should there be on the earth? *J. Creation* **23**(3): 61–69, 2009.
16. Spencer, W., Impacts and Noah’s Flood—how many and other issues, *J. Creation* **27**(1): 85–89, 2013.

Pseudo-pseudogenes: revealing further complexity in the genome

Jean K. Lightner

By definition, pseudogenes are the remnants of former genes that are no longer functional. It is not that anyone has observed a functional gene become non-functional, but it is inferred based on comparisons with protein-coding genes. A pseudogene sequence is similar to that of known protein-coding genes, but lacks an obvious promoter or has 'disruptions' in the open reading frame (ORF) that are predicted to prevent translation into a functional protein.¹ Based on the assumption that they have no function, evolutionists had believed that pseudogenes could provide a record of DNA changes where natural selection is not acting.

Some evolutionists have promoted the idea that similar sequences in pseudogenes strongly support common ancestry, especially between humans and great apes. The alleged disruptions in the sequence are attributed to random copying errors. If two organisms appear to carry identical disruptions, then it is considered far more likely that they both inherited them from a common ancestor than that those errors occurred independently. While created genes might need to be identical in some regions to carry out their normal function, no-one would expect a creator to put the same error in two different organisms.²

An oft-cited example is the GULO gene. In many animals it produces an enzyme necessary for the final step in vitamin C synthesis. Yet in humans, primates, and some other

animals, it is a pseudogene. By selectively presenting data, one can make a compelling sounding story that humans inherited the mistake from a common primate ancestor. However, investigations by Woodmorappe³, Truman and Terborg⁴, and Tomkins⁵ all show that a more comprehensive view of the evidence reveals patterns that contradict evolutionary predictions. Despite this, some evolutionists have continued to promote the human GULO pseudogene as powerful evidence for common ancestry, ignoring inconvenient details (i.e. ones that do not fit their pre-conceived ideas).⁶

The whole concept that pseudogenes provide compelling evidence for universal common descent hinges on the idea that these sequences are truly *not* functional and that mutations are merely random events. Otherwise, creationists have a competing, plausible explanation for why these sequences exist.⁷ That is, any particular pseudogene may be functional, as it was created to be. Alternatively, a pseudogene may have lost function in various lineages (as appears to be the case with the GULO gene), with the same mutations being attributable to the fact that those regions are predisposed to such mutations.

Despite superficial appearances, not all pseudogenes are functionless. Over a decade ago, it was recognized that most suitably investigated pseudogenes were found to play important functional roles.⁸ Creationists have noted this.⁹ Further scientific research continues to challenge the conventional view of pseudogenes.

Regulating genes

Even though most of the human genome does not code for proteins, at least 70% of the sequences are transcribed (copied to make RNA). Many different types of RNA are now known to regulate the expression of genes, insuring that the proper amount

of gene product is expressed in the right place at the right time. Some of these RNA regulatory molecules are derived from pseudogenes.¹⁰

Several hundred pseudogenes are known to be transcribed in a variety of tissues and tumours. Some are transcribed in the sense direction, as is typical for genes; others are transcribed in the anti-sense (reverse) direction. Either way, the sequence is important for proper function. For example, some pseudogenes look very similar to an actual protein-coding gene. This sequence complementarity helps the pseudogene RNA target and bind the gene, which is essential for guiding in proteins to silence that gene. In some cases the pseudogene RNA can also function as a scaffold, providing a base on which molecular machinery is assembled.¹⁰

Of course, evolutionists still interpret the origin of these pseudogenes within their naturalistic paradigm. It is known that some protein-coding genes are also reverse transcribed (from 3' to 5', rather than 5' to 3'), and this antisense RNA product can help regulate the gene. Evolutionists have assumed that this bidirectional transcription of the protein-coding gene was the initial state. Then the gene was duplicated and damaged (where the pseudogene appears to have introns) or retrotransposed (where introns appear to be absent, as in processed pseudogenes), and the pseudogene now carries out this role.¹¹

This explanation presupposes universal common ancestry. Additionally, it requires several highly unlikely events. Gene regulatory networks cannot just be randomly interrupted or changed without jeopardizing the organism. In the cases where over-expression of pseudogene RNA is associated with loss of cell-cycle control and cancer, additional antisense RNA copies are not tolerated.¹⁰ Thus, the postulated intermediaries would not result in viable organisms.

Protein coding

The ‘disruptions’ that prevent pseudogenes from being translated into full length proteins are stop codons that appear amid the ORF sequence. Normally, such interruptions would stop the formation of the protein, because the mRNA translation machinery would terminate the addition of amino acids when it recognizes the stop codon. It was a great surprise, therefore, when a human pseudogene, which had several stop codons scattered across the ORF, was found to form a functional protein. It was observed that transcription of the pseudogene did not initiate from the predicted start codon. The resulting frameshift yielded an unusual, yet functional, olfactory receptor protein.¹²

It has been shown that over 100 pseudogene RNAs are translated into peptides.¹ Interestingly, 74% of the pseudogene peptides identified in humans had a similar transcript identified in the mouse, suggesting that they are functional.¹³ Ironically, the sequence similarity between humans and other animals (both rodents and primates) is now being

used to argue that these translated pseudogenes have function.¹

A recent article has introduced a new term into the scientific literature: ‘pseudo-pseudogenes’. The researchers found a clear case of a pseudogene being translated into a functional olfactory protein in *Drosophila sechellia*, a fruit fly that feeds almost exclusively on ripe fruit. In *Drosophila melanogaster* the intact gene detects acetic acid, a chemical found in the fermenting food which they, and most other *Drosophila* species, consume. It would be tempting to surmise that *D. sechellia* lost a gene it no longer needed, but the research showed, instead, that the pseudogene now codes for a protein with distinct odour-tuning properties.¹⁴

The olfactory receptor pseudogene found in *D. sechellia* differs from the one found earlier in humans in that the ‘premature’ stop codon is read through. Only recently has it been recognized that reading through a stop codon even occurs in eukaryotes, though it had been known to occur in bacteria.¹⁵ In *D. sechellia*, the downstream sequence was shown to be the critical factor that

allowed this readthrough to occur in neuronal tissue. Given the structure of other olfactory pseudogenes, the researchers suggest this may be a widespread phenomenon.¹⁴

Interestingly, decades ago creationist John Woodmorappe had predicted what now has been found in these so-called pseudo-pseudogenes: many pseudogenes are actually ‘locked’ genes, intended to be read only by readthrough of the premature stop codon, which may be limited to specific tissues. If the ability of readthrough is lost, the gene would become permanently ‘locked’, and then would truly be non-functional.¹⁶ Thus, most pseudogenes were prematurely labelled as disabled genes because this and other design features were not understood.

Although the pseudogene in *D. sechellia* may have been derived from the similar gene found in other *Drosophila* species, this does not mean that the changes were merely due to naturalistic processes, such as random mutation, natural selection, and genetic drift. There are many well-recognized mechanisms in the genomes of all organisms to facilitate adaptive phenotypes.¹⁷ DNA editing ability exists within our immune system, and it has been hypothesized DNA editing may play a role in adaptive mutations as well.¹⁸ It should be self evident that adaptation, itself, does not turn one kind of organism into another; all *Drosophila* are still flies.



Figure 1. A gene that helps *Drosophila melanogaster* detect acetic acid in rotting fruit appears to have become a pseudogene in *D. sechellia*; yet when researchers investigated, they found this ‘pseudogene’ produces a functional protein with its own distinct odour-tuning properties.

Motivation for humility and trust

Despite mounting evidence for the functionality of pseudogenes, some evolutionists still promote them as compelling evidence of common ancestry of humans and primates. In reality it is an argument from ignorance, or at best from outdated beliefs. Their worldview, which assumes universal common ancestry, obliges them to see functional pseudogenes as the exception, and they boldly claim that pseudogene sequences

are non-functional until proven otherwise.⁶ Such arguments repeatedly crumble as more scientific evidence comes to light.¹⁹

Previous conclusions about pseudogenes were based on knowledge of straightforward protein-coding genes. That knowledge was incomplete, as it is now recognized that stop codons do not universally stop the translation process and some promoters are not readily discernible by sequence alone. Many scientists underestimated the complexity necessary for the right protein to be expressed in the right place at the right time. It is understandable why the initial misconception existed, but now it should be recognized that the term ‘pseudogene’ is commonly a misnomer. This should engender humility in us all; no matter how much we learn about God’s creation, there is always more to know. It should also encourage us to trust the One who was wise enough to place all the necessary components in place so the right things show up in the right place and at the right time.

References

- Xu, J. and Zhang, J., Are human translated pseudogenes functional? *Molecular Biology and Evolution* 33(3):755–760, 2016.
- Max, E.E., Plagiarized errors and molecular genetics, *Creation Evolution J.* 6(3):34–46, 1986–1987; ncse.com/cej/6/3/plagiarized-errors-molecular-genetics, accessed 7 January 2017. The same article with further dialog is archived at www.talkorigins/faqs/molgen, which was last updated in 2003.
- Woodmorappe, J., Potentially decisive evidence against pseudogene ‘shared mistakes’, *J. Creation* 18(3):63–69, 2004.
- Truman, R. and Terborg, P., Why the shared mutations in the Hominidae exon X GULO pseudogene are not evidence for common descent, *J. Creation* 21(3):118–127, 2007.
- Tomkins, J.P., The human GULO pseudogene—evidence for evolutionary discontinuity and genetic entropy, *Answers Research J.* 7:91–101, 2014.
- Venema, D., Is there ‘junk’ in your genome? part 4, from biologos.org/blogs/dennis-venema-letters-to-the-duchess/understanding-evolution-is-there-junk-in-your-genome-part-4, accessed 21 April 2017.
- Woodmorappe, J., Are pseudogenes ‘shared mistakes’ between primate genomes? *J. Creation* 14(3):55–71, 2000.
- Balakirev, E.S. and Ayala, F.J., Pseudogenes: Are they ‘junk’ or functional DNA? *Annual Review of Genetics* 37:123–151, 2003.
- Woodmorappe, J., Pseudogene function: regulation of gene expression, *J. Creation* 17(1): 47–52, 2003.
- Groen, J.N., Capraro, D., and Morris, K.V., The emerging role of pseudogene expressed noncoding RNAs in cellular functions, *The International J. Biochemistry & Cell Biology* 54: 350–355, 2014.
- Johnsson, P., Morris, K.V., and Grandér, D., Pseudogenes: a novel source of trans-acting antisense RNAs, *Methods in Molecular Biology* 1167:213–226, 2014.
- Lai, P.C., Bahl, G., Gremigni, M., Matarazzo, V., Clot-Faybesse, O., Ronin, C., and Crasto, C.J., An olfactory receptor pseudogene whose function emerged in humans: A case study in the evolution of structure–function in GPCRs, *J. Structural and Functional Genomics* 9: 29–40, 2008.
- Ji, Z., Song, R., Regev, A., and Struhl, K., Many lncRNAs, 5’ UTRs, and pseudogenes are translated and some are likely to express functional proteins, *eLife* 4:e08890, 2015.
- Prieto-Godino, L.L., Rytz, R., Bargeton, B., Abuin, L., Arguello, J.R., Peraro, M.D., and Benton, R., Olfactory receptor pseudo-pseudogenes, *Nature* 539(7627):93–97, 2016.
- Dabrowski, M., Bukowy-Bieryllo, Z., and Zeitkiewicz, E., Translational readthrough potential of natural termination codons in eucaryotes—The impact of RNA sequence, *RNA Biology* 12(9):950–958, 2015.
- Woodmorappe, J., Unconventional gene expression and its relationship to pseudogenes, *Proceedings of the Fifth International Conference on Creationism*, Creation Science Fellowship, Pittsburgh, PA, pp. 505–514, 2003.
- Terborg, P., Evidence for the design of life: part 1—genetic redundancy, *J. Creation* 22(2): 79–84, 2008; Terborg, P., Evidence for the design of life: part 2—baranomes, *J. Creation* 22(3):68–76, 2008; Terborg, P., The design of life: part 3—an introduction to variation-inducing genetic elements, *J. Creation* 23(1):99–106, 2009; Terborg, P., The design of life: part 3—variation-inducing genetic elements and their function, *J. Creation* 23(1):107–114, 2009.
- Lightner, J.K., Adaptive genetic changes by design: a look at the DNA editing by activation-induced cytidine deaminase (AID), *Creation Research Society Quarterly* 52(4):265–274, 2016.
- See references 4–6 for problems with the human GULO pseudogene argument. The alleged ‘vitellogenin pseudogene’ was addressed in Tomkins, J.P., Challenging the BioLogos claim that a vitellogenin (egg-laying) pseudogene exists in the human genome, *Answers Research J.* 8:403–411, 2015. The human beta-globin pseudogene was discussed in Tomkins, J.P., The human beta-globin pseudogene is non-variable and functional, *Answers Research J.* 6:293–301, 2013.

Mammoth taxonomy problems

Michael J. Oard

Evolutionary scientists have worked out a scheme for the origin and evolution of mammoths from elephants.¹ Mammoths supposedly arrived in Eurasia from Africa about 3 Ma ago and evolved from *Mammuthus meridionalis* to *M. trogontherii* to *M. primigenius* (the woolly mammoth). *M. trogontherii* then migrated across the Bering Land Bridge into North America about 1.5 Ma ago and became the Columbian mammoth, *M. columbi*. The woolly mammoth is assumed to have evolved in Siberia during the late Pleistocene around 250,000 years ago and spread to the rest of Eurasia and North America. We disagree with the dates, but the general idea of mammoths spreading into North America during the Ice Age is accepted by creation scientists. This taxonomy is based mainly on teeth. However, the classification or taxonomy of mammoths is still not worked out.²

Mammoth splitting

The taxonomy of North American mammoths is especially a problem for evolutionists, who view ‘species’ as distinct, interbreeding units. The taxonomic splitters have dominated the conversation. The earliest mammoths are of course said to be ‘primitive’, similar to *M. meridionalis* in Europe. Lister and Sher reject the idea that *M. meridionalis* (figure 1) was ever in North America, as some evolutionists have suggested based on flawed data: “Past identifications were often based on worn molars and failed to take into account the mode of eruption and wear among elephants.”³

The tooth wear had caused the number of lamellae, or parallel ridges, to have been miscounted, and so the mammoth was assumed to be the primitive form. I wonder how often this kind of mistake happens because of their assumptions. ‘Advanced’ mammoths are sometimes dated older than ‘primitive’ mammoths, adding to their consternation. So, it appears the evolutionary terminology ‘primitive and advanced’ is subjective and dependent on reasoning from the ‘dates’. This also shows that both evolutionists and creationists need to be cautious with our models and not jump to conclusions too quickly.

It appears that the European *M. trogontherii* and American *M. columbi* are the same type of mammoth and should not be different species:

“On this evidence, the source of *M. columbi* lies in *M. trogontherii* of Eurasia, its appearance in North America representing a dispersal and the distinction between the two species largely a matter of usage.”⁴

Lister and Sher conclude that despite all the names given to North American mammoths, there are only

two firmly established ‘species’: *M. columbi* and *M. primigenius*. However, scientists that espouse evolution admit it is very likely *M. columbi* and *M. primigenius* are the same species,^{5,6} especially since there are a number of intermediates or hybrids between these two supposed species that are given several names, such as *M. hayi*, *M. haroldcooki*, *M. jeffersonii*, or *M. imperator*. It appears the taxonomic splitters have been responsible for mammoth taxonomy.

Creationist suggestions

Evolutionists think that species are like our created kinds: interbreeding organisms that cannot breed with other species. However, we can accept all these mammoths as one created kind, since they can interbreed and look much alike. The kind is obviously at a higher classification than species with the *average* kind at the genus or family level.

The evolutionist taxonomic confusion with mammoths also shows us that we should be cautious about accepting the details of mammoth

taxonomy, dividing an organism into multiple species, since many assumptions and misinterpretations seem to go into it. The fossils point to one kind that has much variability built in. This especially shows up in the teeth. The special features of the woolly mammoth could be simply adaptations to the cold, since they lived in the colder regions compared to the Columbian mammoth.

Whether mammoths are one kind, and separated from extinct Ice Age mastodons or living and extinct types of elephants cannot be known for certain. What we do know supports what I have suggested before⁷ that the elephants of order Proboscidea, with their many similarities, are all one kind. This is also the opinion of Sarfati.⁸ This is not evolution, but simply the variation due to different environments triggering various expressions of the pre-existing gene pool created within the elephant kind.

References

1. Lister, A. and Bahn, P., *Mammoths*, MacMillan, New York, 1994.
2. Lister, A.M. and Sher, A.V., Evolution and dispersal of mammoths across the Northern Hemisphere, *Science* **350**:805–809, 2015.
3. Lister and Sher, ref. 2, p. 805.
4. Lister and Sher, ref. 2, p. 808.
5. Milius, S., DNA: mammoths may have mixed—supposedly separate types may really have been one, *Science News* **180**(12):13, 2011.
6. Oard, M.J., Woolly and Columbian mammoths likely the same species, *J. Creation* **26**(2):12–13, 2012.
7. Oard, M.J., *Frozen in Time: Woolly Mammoths, the Ice Age, and the Biblical Key to Their Secrets*, Master Books, Green Forest, AR, pp. 175–179, 187–188, 2004.
8. Sarfati, J., Mammoths—riddle of the Ice Age, *Creation* **21**(4):10–15, 2000.



Figure 1. Complete skeleton of *Mammuthus meridionalis* (Museo Nazionale d'Abruzzo, L'Aquila)

Banded iron formations formed rapidly

Harry Dickens

A banded iron formation (BIF) is a sedimentary rock characterized by alternating bands of iron oxide and chert. Individual bands may vary in thickness from less than a millimetre to metres, and the overall succession of bands may be hundreds of metres thick. The principal iron minerals are the iron oxides hematite and magnetite.¹ BIFs have a chemical composition unlike any sedimentary material being deposited in significant quantities on the modern earth.²

BIFs are economically important since over 95% of iron resources of the world occur in BIFs.³ They are the principal source of iron for the global steel industry. BIFs have been found on all continents except Antarctica.¹ Giant (100,000 billion tonnes or more) BIFs are located in South Africa, Australia, Brazil, Russia, and Canada. Smaller but still significant BIFs are

found in many other places including in the USA, India, Ukraine, and China (figure 1).⁴

Although BIFs are widespread geographically in Precambrian provinces, they have a limited occurrence in time, being principally found in Archean and Paleoproterozoic ‘age’ provinces,⁵ with a few smaller occurrences in Neoproterozoic ‘age’ provinces.⁶ BIFs are absent from Mesoproterozoic ‘age’ provinces (figure 2).⁷

The Algoma, Superior, and Rapitan types are the three main types of BIFs and are named after locations in Canada.⁸ Algoma-type BIFs are chiefly found in volcano-sedimentary sequences of Archean greenstone belts. These BIFs are stratigraphically linked to or interlayered with submarine-emplaced volcanic rocks in greenstone belts and, in some cases, with volcanogenic massive sulphide (VMS) deposits.⁴ Typical Algoma-type iron formations rarely extend for more than 10 km along strike and are less than 50 m thick. Algoma-type and Superior-type iron formations are similar in mineralogy.⁴

Superior-type deposits are by far the most economically important type

of BIFs globally, and are situated in relatively undeformed continental margin sedimentary basins around unconformable contacts on granite-greenstone terrains around the Archean/Proterozoic boundary.⁹ These BIFs are large in size (over 100 km in lateral extent and more than 100 m in thickness).¹⁰ The Paleoproterozoic Hamersley Basin in Western Australia contains one of the world’s largest areas of BIFs. The basin itself outcrops over an area of about 100,000 km². The chemical and lateral stratigraphic continuity of these BIFs on a variety of scales is quite extraordinary. Microbands (about 1 mm thick) can be traced for hundreds of kilometres. In addition, the broad alternation and concordance of BIFs with other sedimentary rocks (mainly shale and carbonate) and volcanics (including dolerite and rhyolite) can be easily recognised over the whole area of the outcrop.²

Rapitan-type iron formations are interbedded with what is commonly interpreted in the mainstream literature as Neoproterozoic ‘glacials’.⁷ These iron formations are found in extensional grabens that are associated



Figure 1. Global occurrence and size of large Precambrian BIFs. Gt = 10⁹ tonnes or billion tonnes (after Bekker *et al.*⁴).

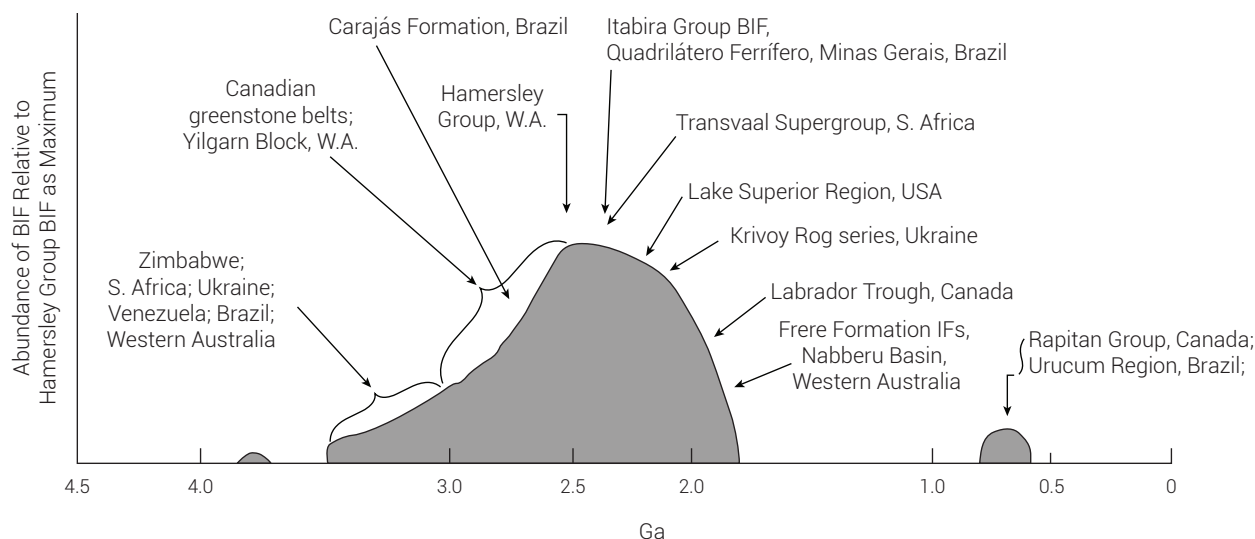


Figure 2. Schematic diagram indicating the relative volume of BIFs over time. A number of the major BIFs or major BIF regions are shown. Refer to figure 1 for many of their locations. Estimated abundances are relative to the Hamersley Group BIF volume which is taken as a maximum. Ga = billion years ago radiometric time (from Klein⁷).

with the initial breakup of the Rodinia supercontinent,¹¹ and are commonly found in association with mafic volcanics.¹²

BIF deposition

Earlier models of BIF formation invoked the slow deposition of annual micro-laminations (chemical varves) over millions of years.¹³ However, modern interpretations consider BIFs as deep-sea sediments with iron and silica sourced from reactions between circulating seawater and hot mafic to ultramafic rocks as hydrothermal systems vented onto the sea floor. Hot acidic hydrothermal fluids would *immediately* precipitate colloidal particles of iron hydroxide and iron silicates on quenching by cold neutral seawater. Episodic and rapid deposition of turbidity and density currents may have only lasted a few hours to days.¹⁹ Laboratory studies show that colloidal solutions rapidly precipitate into regular and ordered bands.¹⁴

Laboratory studies also show that the rate of chemical reactions increases exponentially with temperature.¹⁵ This

explains why various mineral assemblages and petroleum can form rapidly under hydrothermal conditions. High-temperature fluids can extract and transport large quantities of silica and iron from mafic igneous rocks.⁹

Episodic deposition of giant early Precambrian iron formations is emphasized by geochronologic studies, since their formation is coeval with, and genetically linked to, time periods when large igneous provinces (LIPs) were emplaced.⁴ Neoproterozoic BIFs are also associated with periods of intense magmatic activity.⁴

Evidence has been put forward¹⁶ that the thickest and most extensive Paleoproterozoic BIFs in the Hamersley Basin formed along with pulses of intense magmatism (including the emplacement of a large igneous province comprising more than 30,000 km³ of volcanic rocks) driving a period of enhanced submarine hydrothermal activity. Emplacement of such an enormous volume of volcanic rocks is beyond anything happening in today's world (for example, the famous Mt St Helens on 18 May 1980 erupted only 1.2 km³ (0.3 mi³) of

ash.¹⁷ The description of high-energy processes, such as huge and intense volcanic activity along with enhanced hydrothermal activity, is in stark contrast to the description in the same paper of the rate of BIF deposition being compared with the gentle rate of the settling of fine sedimentary particles in the modern open ocean.

A young-earth-creation framework for BIFs

The chemical make-up, common fine lamination, and the lack of detrital components in most BIFs suggest that they resulted from deposition as chemical sediments, below wave base, in the deeper anoxic parts of ocean basins.⁷ The rare-earth element profiles of almost all BIFs, with generally pronounced positive Europium anomalies, indicate that deep ocean hydrothermal activity admixed with seawater was the source for the precipitation of the iron and silica.⁷

"I was there when he set the heavens in place, when he marked out the horizon on the face of the deep" (Proverbs 8:27 NIV).

“Now the earth was formless and empty, darkness was over the surface of the deep, and the Spirit of God was hovering over the waters” (Genesis 1:2 NIV).

The earth had its first global ocean (the deep) on Days 1 and 2, before the gathering of waters and appearance of land on Day 3 (Genesis 1:2–10). In Genesis 1:2 the earth would have appeared from space like a relatively smooth formless watery ball, without obvious features or landmarks such as mountains protruding above the water.¹⁸

“Or who shut in the sea with doors when it burst out from the womb” (Job 38:8 ESV).

A common iron oxide mineral in BIFs is hematite (Fe₂O₃) and this may have appeared blood-coloured as if from the womb.¹⁸ I consider that the earlier Precambrian iron formations (Algoma and Superior types) formed early in the Creation Week by catastrophic pouring out of volcanics and associated banded iron formations.¹⁸

The second and only other global ocean was during the peak of Noah’s Flood (Genesis 7:19–20).¹⁸ Rapitan-type iron formations are interbedded with Neoproterozoic mixtites and these mixtites are considered to represent mass flows early in Noah’s Flood.¹⁸ Geochemical data indicates that Neoproterozoic iron formations result from mixing between a hydrothermal and detrital component, while rare earth element data indicates substantial interaction with seawater.¹² I infer that the Flood’s fountains, that rifted the crust open, would have provided the hydrothermal component,¹⁹ and erosion of land caused by the Flood’s rain²⁰ would have supplied the detrital component.

Conclusions

Modern evidence⁹ indicates that BIFs formed rapidly in deep water by catastrophic precipitation from volcanic and associated silica-rich

and iron-rich hydrothermal fluids. This is consistent with my young earth model correlation of BIFs with the Bible’s two occasions of globe-covering ocean—early Precambrian BIFs forming in the early Creation Week and late Precambrian BIFs forming in the initial phase of Noah’s Flood.¹⁸ BIFs are clear-cut examples of non-uniformitarianism in the earth’s history;^{5,6} modern analogues are unknown⁴ and BIFs are restricted in time to the Archean, Paleoproterozoic, and Neoproterozoic.

References

1. Zientek, M.L. and Orris, G.J., *Geology and nonfuel mineral deposits of the United States*, U.S. Geological Survey Open-File Report 2005-1294A, 2005.
2. Trendall, A.F., Hamersley Basin; in: *Geology and Mineral Resources of Western Australia*, Western Australia Geological Survey, Memoir 3: 163–189, 1990.
3. Gross, G.A., Lake Superior-type iron formations; in: Eckstrand, O.R., Sinclair, W.D., and Thorpe, R.I. (Eds.), *Geology of Canadian Mineral Deposit Types*, Geological Survey of Canada, *Geology of Canada* 8:54–66, 1996.
4. Bekker, A., Slack, J.F., Planavsky, N., Krapez, B., Hofmann, A., Konhauser, K.O., and Rouxel, O.J., Iron formation: The sedimentary product of a complex interplay among mantle, tectonic, oceanic, and biospheric processes, *Economic Geology* 105:467–508, 2010.
5. Groves, D.I., Vielreicher, R.M., Goldfarb, R.J., and Condie, K.C., Controls on the heterogeneous distribution of mineral deposits through time; in: McDonald, I., Boyce, A.J., Butler, I.B., Herington, R.J., and Polya, D.A. (Eds.), *Mineral Deposits and Earth Evolution*, Geological Society, London, Special Publications, 248: 71–101, 2005.
6. Reddy, S.M. and Evans, D.A.D., Paleoproterozoic supercontinents and global evolution: correlations from core to atmosphere; in: Reddy, S.M., Mazumder, R., Evans, D.A.D., and Collins, A.S. (Eds.), *Paleoproterozoic Supercontinents and Global Evolution*, Geological Society, London, Special Publications 323:1–26, 2009.
7. Klein, C., Some Precambrian banded iron formations (BIFs) from around the world: their age, geologic setting, mineralogy, metamorphism, geochemistry, and origin, *American Mineralogist* 90:1473–1499, 2005.
8. Stockwell, C.H., McGlynn, J.C., Emslie, R.F., Sanford, B.V., Norris, A.W., Donaldson, J.A., Fahrig, W.F., and Currie, K.L. IV., *Geology of the Canadian Shield*; in: *Geology and Economic Minerals of Canada*, Geological Survey of Canada, Economic Geology Report No.1, Department of Energy, Mines and Resources Canada, 1970.
9. Lascelles, D.F., Plate tectonics caused the demise of banded iron formations, *Applied Earth Science* 122(4):230–241, 2013.
10. Evans, K.A., McCuaig, T.C., Leach, D., Angerer, T., and Hagemann, S.G., Banded iron formation to iron ore: a record of the evolution of Earth environments? *Geology* 41(2):99–102, 2013.
11. Baldwin, G.J., Turner, E.C., and Kamber, B.S., A new depositional model for glaciogenic Neoproterozoic iron formation: insights from the chemostratigraphy and basin configuration of the Rapitan iron formation, *Canadian J. Earth Sciences* 49(2):455–476, 2012.
12. Cox, G.M., Halverson, G.P., Minarik, W.G., Le Heron, D.P., Macdonald, F.A., Bellefroid, E.J., and Strauss, J.V., Neoproterozoic iron formation: an evaluation of its temporal, environmental and tectonic significance, *Chemical Geology* 362: 232–249, 2013.
13. Garrels, R.M., A model for the deposition of the microbanded Precambrian iron formations, *American J. Science* 287:81–106, 1987.
14. George, J. and Varghese, G., Intermediate colloidal formation and the varying width of periodic precipitation bands in reaction-diffusion systems, *J. Colloid and Interface Science* 282:397–402, 2005.
15. Loewenthal, D., Bruce, R.H., and Bruner, I., Are millions of years necessary for petroleum formation? *Israel Geological Society, Annual Meeting 1993*, p. 85, 1993.
16. Barley, M.E., Pickard, A.L., and Sylvester, P.J., Emplacement of a large igneous province as a possible cause of banded iron formation 2.45 billion years ago, *Nature* 385:55–58, 1997.
17. USGS, Comparisons with other eruptions, pubs.usgs.gov/gip/msh/comparisons.html, 25 June 1997.
18. Dickens, H. and Snelling, A.A., Precambrian geology and the Bible: a harmony, *J. Creation* 22(1):65–72, 2008.
19. Dickens, H. and Snelling, A.A., Terrestrial vertebrates dissolved near Flood fountains, *Answers Research J.* 8:437–447, 2015.
20. Dickens, H., The ‘Great Unconformity’ and associated geochemical evidence for Noahic Flood erosion, *J. Creation* 30(1):8–10, 2016.

Design: just a trick of the mind?

Shaun Doyle

Life looks like it was designed. Even Richard Dawkins admits it: “Biology is the study of complicated things that give the appearance of having been designed for a purpose.”¹ It seems biology cannot do without design language. However, evolutionists say life is a result of mindless processes, not design. So, if life is not designed, why does it fool us so readily into thinking it is? Some evolutionists try to explain why the appearance of design in biology is convincing though misleading—with a phenomenon called ‘apophenia’. Apophenia is ‘seeing meaningful connections in random phenomena’. Put simply, the idea is that the appearance of design in biology is just a trick of the way our brains work.

Skeptic Michael Shermer has developed specific terminology for this, such as ‘patternicity’ (that we tend to see meaningful patterns where there are none) and ‘agenticity’ (the tendency to infer invisible causes control the world).² Shermer says that we have an ‘overactive agency detection device’ that has evolved because those of our ancestors who tended to err on the side of caution and presume agent activity in uncertain predator-prey circumstances were more likely to survive than those not so cautious (figure 1). Shermer then extrapolates this to all our beliefs about gods, spirits, conspiracies, and so forth, since we have ‘a developed cortex and a theory of mind’. He says they are all just the product of an overactive agency detection device in our heads, regularly inferring patterns and agents where no such things exist.

From the start, however, there is a heady self-referential confusion in Shermer’s claims that apophenia-type

misunderstandings are so broadly applicable. Apparently, Shermer *knows* that there are no invisible causes controlling the world, and yet scientists regularly appeal to invisible causes to explain patterns they think they observe. How can we trust our brains when we infer one set of invisible causes and not another?

Agenticity: insufficient grounds for rejecting biological design

Arguing from a general tendency toward agential ‘false positives’ to a *specific* instance of a ‘false positive’ conclusion is a logical misstep. Even if we are hardwired to err on the side of a presumption of agency, it does not mean we are always wrong to do so. We intuitively infer agency in many instances where a much more

rigorous abductive argument, which considers non-agential alternatives, could be constructed to provide objective justification for a conclusion to agency. In other words, we are not unable to test inferences to agent causation against alternatives. As such, the mere presence of an ‘overactive agency detection device’ is not a sufficient reason to conclude that a particular design claim is false. Scientists routinely use instruments that measure too much—it’s called ‘noise’, and it is routinely accounted for in other ways.

Indeed, agenticity is not itself an argument against design. Rather, it is an explanation for why people see design in things that are *clearly* not designed. For it to be applicable to an argument against design, it must be *clear* that what we believe we are seeing agency in does not in fact



Figure 1. Evolution supposedly gave us an overactive ‘agency detection device’ as an extension of a big brain and our ancestors’ predisposition to assume the rustling in the bushes was a predator.



Figure 2. Naturally formed indentations in rocks can sometimes look like recognizable shapes, such as this footprint-like indentation in an igneous rock.

result from agency. For bunny shapes in clouds and footprints in igneous rocks³ (figure 2) this is not hard to demonstrate—these are clear-cut examples of purely natural phenomena. For presumed predators in bushes, it is also easy to figure out whether a predator is there or not. Unlike these examples, however, providing a plausible naturalistic account for the origin of the first free-living cellular life has proven practically impossible.⁴ As such, it is anything but clear that cellular life is a clear-cut example of a purely natural phenomenon. Unless evidence can be brought forward that our ‘agency detection software’ *is* in fact wrong regarding the appearance of design in life, citing apophenia or agenticity as an argument against design begs the question—the only reason given to believe that life is not designed is the assumption that life is not designed.

Agenticity and the design inference

Citing agenticity against biological design assumes that we just rely on our intuition and/or an inchoate analogy to man-made objects in inferring design in biology. This is plainly false. Indeed, if agenticity inherently undercut our warrant for discerning

the difference between design and mindless processes, then the SETI program and archaeology could only be viewed as pointless exercises, since we would not be able to overcome our innate tendency to false positives to discern the difference between design and coincidence.

Moreover, works on information theory and design detection have grown significantly in the creationist and ID literature.⁵ For instance, we have various well-developed design concepts, such as William Dembski’s ‘specified complexity’,⁶ Werner Gitt’s ‘Universal information’,⁷ Royal Truman’s ‘Coded Information Systems’,⁸ Michael Behe’s ‘irreducible complexity’,⁹ and Alex Williams’ ‘Irreducible Structure’,¹⁰ just to name a few examples. These ideas make specific claims that enable us to discern the difference between designed and non-designed objects. Not only that, but in many cases only certain types of designed objects will register a positive signal according to these definitions.

Is ‘agenticity’ a bad thing?

Shermer is right that an increasing body of literature is showing that humans, and especially children, are strongly predisposed to viewing the world in teleological and religious

categories.¹¹ Indeed, if God designed our cognitive faculties to intuitively see the hand of a transcendent designer in nature, then a predisposition to recognize agency makes sense. This does not mean our agency detection devices are foolproof, but it would mean that we cannot simply write off as wrong belief in God just because it was intuitively formed.

Of course, our ‘agency detection device’ is not merely applicable to spirits; it applies to everyday interactions as well. Our ability to distinguish human speech and writing from gibberish is rarely inaccurate, even if we often struggle to understand what people are trying to say. Our natural ability to distinguish man-made objects from natural objects rarely misfires, even though it is not perfect. If these features of our cognitive framework were *generally* unreliable, our ability to communicate and design things would be severely crippled.

This is not merely true for modern man; it also applies to the ancients. While ancient people were often wrong about things they had no ability to investigate, the things they could investigate were common knowledge. They were wrong about the scientific details of reproduction (in many respects seeing it as akin to farming—the woman as the passive ‘soil’, and the man supplying the active ‘seed’), but they knew that babies arose from sex. They had many wrong ideas about medicine, but they knew that dead people stayed dead. They could clearly reason causally and come to reliable conclusions, even if their extrapolations about the details (which they often reasoned to by analogy from what they did know) were often wrong. And it was this ability to reason causally that meant they could tell the difference between hieroglyphics and footprints, snakes and stones. In the most relevant senses for a preliminary intuition of design in biology, the cognitive faculties of the ancients were indeed reliable.

Theism, agenticity, and causation

If we are predisposed to believe patterns have meaning, what sort of meaning do they have? If we are predisposed to seeing invisible agents as explanations of patterns, what sort of an explanation is an agent? An agent is a *cause*, something or someone that *produces* effects (usually) for purposes. Even natural causes, though they may have no apparent purpose behind them, are still causes. Not only is the principle that effects have causes common and crucial to ‘patternicity’ and ‘agenticity’, it is a much broader and more foundational assumption of human (and animal) cognition than either, and fundamental to science.¹²

As such, since our predisposition toward belief in a divine designer comes from a sense of patterns and causality, then apart from *presuming* naturalism it’s still not clear why the inference should simply be considered wrong. When we wrongly infer that there is a predator behind the bushes, we are still *not* wrong to infer a *cause* for the rustling of the bushes. Indeed, it is this principle of causality hardwired into us that is the necessary precursor for any supposed ‘overactive agency detection device’ in our heads.

However, what happens if we apply that principle of causality cosmically? What sort of cause could produce the whole of the contingent reality we see around us? Non-theists in times past denied that the reality we see is contingent. But since we now have very good reason to think the universe had a beginning,¹³ it’s clear that it doesn’t *need* to exist.¹⁴ Atheists now typically throw away the principle of causality when it comes to the universe; instead positing that the universe supposedly just popped into being from nothing, by nothing, and for nothing. But why throw the principle of causality away as an

explanation of the universe when it works so well for everything in the universe and is so fundamental to the entire scientific enterprise? They know that the only viable alternative is an agent cause that transcends the universe, such as God.

Naturalistic evolution, agenticity, and the eclipse of reason

The irony is that this argument from ‘agenticity’ may be pushed further than the theorist bargained for. Naturalistic evolution may itself have rendered our cognitive faculties unreliable. Without some way to separate the cognitive faculties we intuit design in biology by from other far-reaching cognitive faculties, such as our ‘hardwired’ belief in causality, naturalistic evolution makes such wider-ranging cognitive faculties inherently defective for finding truth. Ironically, those faculties include the formation of a belief in naturalistic evolution (and even a belief in science itself). Therefore, if our cognitive faculties are only as reliable as this line of thinking suggests, then the belief in naturalistic evolution is itself likely formed by unreliable cognitive faculties, and is thus a self-referentially incoherent belief to hold.¹⁵

Agenticity: without excuse

Romans 1:19 emphatically declares the reliability of our ‘design-biased’ faculties for recognizing God behind it all. In fact, they are reliable enough that we are *morally culpable* for not responding to the revelation of God in nature appropriately. We are without excuse if we ignore the Designer of nature. Indeed, taking God out of the picture calls into question our ability to reliably believe *anything* our brains come up with, not just its belief in the God who designed biology.

References

1. Dawkins, R., *The Blind Watchmaker*, W.W. Norton & Company, New York, p. 1, 1986.
2. Shermer, M., Why people believe invisible agents control the world, scientificamerican.com/article/skeptic-agenticity, 1 June 2009.
3. Doyle, S. and Wieland, C., The ‘giant footprint’ of South Africa, creation.com/giant-footprint, 14 January 2012.
4. Meyer, S.C., *Signature in the Cell*, Harper-Collins, Auckland, New Zealand, 2009.
5. Marks II, R.J., Behe, M.J., Dembski, W.A., Gordon, B.L., and Sanford, J.C. (Eds.), *Biological Information: New Perspectives*, World Scientific Publishing, Singapore, 2013; worldscientific.com/worldscibooks/10.1142/8818#t=toc.
6. Dembski, W.A., *No Free Lunch*, Rowman & Littlefield, New York, 2002.
7. Gitt, W., *Without Excuse*, Creation Book Publishers, Atlanta, GA, 2011.
8. Truman, R., Information Theory—part 1: Overview of key ideas, *J. Creation* 26(3):101–106, 2012; Information Theory—part 2: Weaknesses in current conceptual frameworks; *J. Creation* 26(3):107–114, 2012; Information Theory—part 3: Introduction to Coded Information Systems, *J. Creation* 26(3):115–119; Information Theory—part 4: Fundamental theorems of Coded Information Systems Theory, *J. Creation* 27(1):71–77, 2013.
9. Behe, M.J., *The Edge of Evolution*, Free Press, New York, 2007.
10. Williams, A., Life’s irreducible structure—part 1: Autopoiesis, *J. Creation* 21(2):109–115, 2007; Life’s irreducible structure—part 2: Naturalistic objections, *J. Creation* 21(3):77–83, 2007.
11. Barrett, J.L., Out of the mouths of babes: Do children believe because they’re told to by adults? The evidence suggests otherwise, theguardian.com/commentisfree/belief/2008/nov/25/religion-children-god-belief, 25 November 2008.
12. Craig, W.L., Scientific faith, reasonablefaith.org/scientific-faith, 28 February 2016.
13. Sarfati, J., If God created the universe, then who created God? *J. Creation* 12(1):20–22, April 1998.
14. Pruss, A.R., The Leibnizian Cosmological argument; in: Craig, W.L., *The Blackwell Companion to Natural Theology* (Kindle edition), Wiley-Blackwell, Chichester, UK, Kindle Locations 907–3035, 2009.
15. Plantinga, A., *Where the Conflict Really Lies: Science, Religion, & Naturalism*, Oxford University Press, Oxford, pp. 307–350, 2011; reviewed by Kay, M., The hidden god of evolutionary chance vs the Bible’s all-intelligent God, *J. Creation* 28(2):29–34, 2014.

The Catholic Church's response to evolution

Catholicism and Evolution: A history from Darwin to Pope Francis

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The Catholic Church has been perceived as unresponsive to the effect of evolution theory and deep time on culture and theology. At first the Church addressed the issue and for a time officially supported a straightforward interpretation of Genesis. Unfortunately, its priests and theologians came to believe science proved evolution and pressed for a more liberal interpretation of Scripture. Michael Chaberek, a Polish Catholic priest of the Dominican Order,¹ has written a well-researched record of the history of the Catholic Church's response to evolution. He has a Doctorate in Fundamental Theology from Cardinal Stefan Wyszyński University in Warsaw.

Evolution and the Catholic Church before 1909

Before the 'Enlightenment', Catholics as well as Protestants upheld the straightforward reading of Genesis. When evolution was first introduced by Erasmus Darwin's book, the Catholic Church roundly condemned it. But, by the time his grandson Charles' book the *Origin of Species* was introduced in 1859, the attitude had changed enough to cause it to be hotly debated by those who feared they may be denying science and therefore truth. The Synod of Cologne

was convened in 1860 to discuss evolution. The synod rejected the theory, but some theologians tried to soften the Church's rejection. The First Vatican Council convened in 1870 and supported tradition. Pope Leo XIII wrote the *Arcanum* Encyclical of 1880 about the role of marriage, which also condemned evolution, but by then theistic evolution was gaining traction.

Several influential theistic evolutionists, including George Mivart, Dalmace Leroy, and John Zahm, were pecking away at the Church's resolve. Notable early anti-Darwin stalwarts of the Catholic Church, Raffaello Caverni and Luigi Tripepi, tried to counter theistic evolution. Strangely, theistic evolutionists saw evolution portraying a 'better image' of God than Genesis. To do so they had to ignore evolution theory's claims of progress through pain and death, survival of the fittest, and 'nature red in tooth and claw'. Because of the doctrine of Original Sin, theistic evolutionists exempted Adam and Eve from having evolved by declaring a type of special creation.

Zahm, a priest, was probably one of the first full-fledged and open Catholic theistic evolutionists. He not only made the false claim that Augustine and Aquinas were evolutionary precursors, but also believed that evolution was a superior view of God. Zahm even gave Aquinas the title of the 'father of evolution'. But Zahm recognized three huge objections to Darwinism: (1) no one has observed one 'species' changing into another, (2) the fossil record lacks transitional fossils, and (3) no one has observed cross-breeding between 'species'. (Zahm meant the Genesis kinds but evolutionists have several definitions for 'species'.) These objections are still relevant today. To support his position, Zahm used the Church Fathers, whom



he thinks also believed in evolution. Considering the Church's reliance on tradition, Zahm's rewriting history was a useful way to push his claim.

Theistic evolution takes over

The Pontifical Biblical Commission of 1909 reaffirmed the Church's stand on a literal interpretation of Genesis 1–3, but the discussion had moved to accepting something similar to progressive creationism. Theistic evolutionists disregarded the commission. Between 1909 and 1950, the Catholic Church appears to have avoided the issue entirely. In 1950 Pope Pius XII wrote the encyclical *Humani Generis*. It upheld the biblical origin of Adam and Eve and declared that evolution was simply speculation. Unfortunately, the pope also mentioned that the church was open to new research on the question, which the theistic evolutionists exploited. By then theistic evolution had become the accepted paradigm of the theologians. Although officially the Catholic Church had not changed its position on evolution, the theistic evolutionists had essentially turned *Humani Generis* on its head.

Much of the blame for the Catholic compromise on evolution can be

attributed to the Jesuit priest Teilhard de Chardin. As a paleontologist, he was involved in the infamous Piltdown and Peking Man fiascos. I went to a Jesuit high school in the late 1950s and early 1960s. I still remember being taught evolution and that Piltdown Man was one of our ancestors. But in 1953 this was shown to be a fraud—over 40 years after its ‘discovery’! When Chardin’s beliefs became clear, the Church tried to suppress his ideas. Unfortunately, instead of suppressing the teaching of evolution the Church attempted to suppress his eschatology, the logical fruit of marrying evolution and theology and ignoring Scripture. He believed creation and mankind would continue to evolve until we reached the ‘Omega Point’, a utopia when we will usher in the ‘Christos’, the millennium. Although Chardin’s writings were ambiguous and highly philosophical, he became especially popular among theologians and the educated laymen. When I started to become serious about God in college, someone gave me Chardin’s *The Divine Milieu* and *The Phenomenon of Man* to help me grow. I was hopelessly lost within two pages and gave them up. (Chardin later became known as the ‘father of the New Age movement’.²)

The period between 1950 and 1985 was a triumph for evolution. The official Church avoided the issue with the exception of briefly trying to suppress Chardin. Soon, Adam and Eve were no longer excluded from evolution. In 1985 and 1986, and again in 1996, Pope John Paul II again dealt with evolution, but in the usual ambiguous, generally positive way. The pope clearly accepted theistic evolution. His most publicized statement was during the 1996 Pontifical Academy of Sciences:

“Today, almost half a century after the publication of the encyclical [*Humani Generis*], new knowledge has led to the recognition of the theory of evolution as more than a hypothesis” (p. 231).

Like other papal statements, the pope saw the weaknesses in the theory of evolution and he wanted both sides of the issue to be discussed, but unfortunately his statement was purposely exaggerated by the media and theistic evolutionists as supporting evolution. Today official Church gatherings rarely discuss both sides of this issue. This is not surprising, given that the members of the Pontifical Biblical Commission and other church authorities, which advise the Church, are theistic evolutionists. However, some priests, bishops, and cardinals do not endorse evolution.

The Catholic Church has given very little attention to evolution since 1996. It is as if the Church deems it as a settled fact. A 2004 International Theological Commission simply went along with evolution. Cardinal Joseph Ratzinger, who became Pope Benedict XVI in 2005, gave a few comprehensive lectures on evolution. Although he had doubts about large-scale evolution, he would fall generally into the theistic evolution camp. It appeared that correct definitions could bring clarity to the debate. Pope Benedict XVI made no official statement on evolution. Cardinal Christoph Schönborn, from Vienna, Austria, did publish a brief editorial in the 2005 *New York Times* upholding the new theory of Intelligent Design. Of course the article produced outrage by atheists and many theistic evolutionists.

The Catholic Church today

Pope Francis wrote the most recent pronouncements on evolution and seems to have ‘given away the store’. At a 2014 session of the pro-evolution Pontifical Academy of Sciences, he

“... warns that when reading the Genesis account of creation one may ‘imagine that God was a magician, with such a magic wand as to be able to do everything.’ However, according to the Pope, “[I]t was not

like that. God created beings and left them to develop according to the internal laws that He gave each one, so that they would develop, and reach their fullness” (p. 296).

But if we cannot take the clear words of Genesis, written in historical narrative, as straightforward history, then why would we accept the Resurrection or the Virgin Birth? Chaberek seems to downplay the pope’s remarks by stating the pope did not define his terms.

Chaberek declares that it is about time that the Catholic Church really did a thorough study of evolution. They would then expose the wrong ideas, like Haeckel’s embryos, as the fraud they were.^{3,4} Sadly, the embryos are still portrayed within Church publications. He writes:

“The last place a reader would expect to find this fraud is a Catholic encyclopedia. However, even in the latest edition (2003) of the *New Catholic Encyclopedia*, Haeckel’s drawings are featured under the entry *Evolution* without any correction” (pp. 26–27).

They would also discover that biochemistry is strongly against evolution, as Chaberek states:

“Rapid developments in biochemistry are raising many obstacles to the common evolutionary scenario, and theologians now face the need to reinvestigate the original doctrine of the Church and explore whether theistic evolution is in fact compatible with the Christian view of creation” (p. 4).

His book confirms that definitions of terms like species, evolution, and science are very important and commonly misunderstood by theologians and lay people. This lack has caused much confusion, not only in the Catholic Church, but also in the culture as a whole. Chaberek states the Church would gain from not having all pro-evolutionists in their important commissions. Most importantly, they need to quit putting scientists on a pedestal. Scientists are as fallible as other people.

I notice that theistic evolutionists continue to bring up the persecution of Galileo, but theistic evolutionists have rewritten the history of Galileo. They also have misrepresented the early Church Fathers and Medieval theologians by saying they supported evolution. Chabarek does a service by documenting in the book, and especially in an appendix, that the opposite is the case. He points out that some theistic evolutionists have especially shallow thinking: “In effect, many theologians would argue for theistic evolution precisely because ‘there cannot be conflict between science and faith’” (p. 272).

Conclusion

I think Catholics are starting to wake up to the issue of evolution, a trend that will continue as they analyze the case for biblical creation. It is possibly too much to ask for them to reconsider deep time and Noah’s Flood. However, there is a Catholic YEC ministry called the Kolbe Center for the Study of Creation. A few YEC books have been written recently by Catholic priests.^{5,6} Chabarek is a proponent of Intelligent Design (ID) and states that large-scale evolution is not observed and realizes that evolution still has unresolved difficulties, even after 150 years:

“This situation has not substantially changed for 150 years, since all the new scientific discoveries that were assumed to support biological evolution usually revealed unquarable difficulties as well” (p. 228).

He writes several particularly insightful analyses of the irrationality of theistic evolutionists, who reject ID, such as:

“But the only alternatives to intelligent design are precisely those ‘materialistic philosophies’ that the pope called contrary to the Catholic faith about creation. Thus, theistic evolutionists encounter two serious problems: On the one hand they are unable to clearly define the reason

for their rejection of intelligent design, while on the other they must accept the existence of a divine plan in nature to remain orthodox Christians. At best, this leads to an inherent conflict of inconsistency within theistic evolution” (p. 226).

The acceptance of some sort of intelligent design, if not the whole agenda of the Intelligent Design movement,⁷ really should be a no brainer for anyone that calls himself a Christian.

The author also mentions some conundrums for those who believe in human evolution, such as why would the human body evolve ‘defenselessness’ in shedding fangs, claws, thick fur, etc.? Moreover, why would bipedalism evolve?

“This is a problem for evolutionary theory. From a Darwinian point of view, natural selection preserves beneficial changes and eliminates disadvantageous ones, so there would be no evolutionary justification for bipedalism in an animal that can already move faster and more efficiently using all four limbs. If anything, evolution would be expected to move in the opposite direction, from bipedal to quadrupedal locomotion” (p. 188).

Unfortunately, the author still believes in deep time and billions of years, and he even disparages young-earth creationists. Like the Church, he would do well to study the evidence for a young earth, Noah’s Flood, and the biblical exegesis of Genesis 1–11. He has some very mistaken ideas about creation science, which shows, on the most charitable interpretation, that he has failed to read even introductory creationist literature:

“Perhaps some creationists see God as a quite unpredictable magician. On the young earth view, for instance, God must have directly created fossils in the strata, as well as all other signs of the old age of the universe, over the course of the period of creation, understood as six natural days” (p. 297).

The author’s recommendation for the Church

The purpose of the book is to spur the Catholic Church into rethinking its ideas on evolution:

“In this book, I argue that the Catholic Church has not taken an unambiguous stand on evolution. Catholicism currently lacks a straightforward answer to the question of whether evolution, understood as the origin of species, is compatible with the Church’s teaching” (p. 3).

Catholics will find this book will give them insight into the importance of the debate between Genesis and evolution, especially the history of their own tradition’s teaching on creation.

References

1. The letters after his name, O.P., stand for *Ordo Praedicatorum* (‘Order of Preachers’), the formal name for the Dominican Order, which also included Thomas Aquinas.
2. Lane, D.H., *The Phenomenon of Teilhard: Prophet for a New Age*, Mercer University Press, Macon, GA, 1996.
3. van Niekerk, E., Countering revisionism—part 1: Ernst Haeckel, fraud is proven; *J. Creation* 25(3): 89–95, 2011; creation.com/haeckel-fraud
4. van Niekerk, E., Countering revisionism—part 2: Ernst Haeckel and his triple-woodcut print, *J. Creation* 27(1):78–84, 2013; creation.com/haeckel-woodcut
5. Warkulwiz, V.P., *The Doctrines of Genesis 1–11: A Compendium and Defense of Traditional Catholic Theology on Origins*, iUniverse, New York, NY, 2007; reviewed by Oard, M.J., *J. Creation* 22(2):21–22, 2008; creation.com/warkulwiz.
6. Wynne, J.M. and Wynne, S.A., *Repairing the Breach: Explaining the systematic deception behind the war of worldviews, and how Christendom can turn the tide*, P3 Printing, Dallas, TX, 2008.
7. Wieland, C., CMI’s views on the Intelligent Design Movement, creation.com/idm, 30 August 2002.

The not-so-intelligent professor

The Not-So-Intelligent Designer: Why evolution explains the human body and intelligent design does not

Abby Hafer

Cascade Books, an imprint of Wipf and Stock Publishers, Eugene, OR, 2016

Jerry Bergman

Abigail ('Abby') Hafer has a doctorate in zoology from Oxford University and teaches human anatomy and physiology in the nursing programme at Curry College, a small private college of 2,100 students. Her goal for this book was to document what she argues are the many examples of poor design in the human body. From this evidence, she concludes that the body was not designed, but rather it evolved.

All of her examples have been carefully refuted in both the secular and creationist literature. Having taught anatomy for 30 years, I have reviewed many anatomy textbooks in preparation for my classes and am not aware of a single one that makes the claims she does. Rather, they consistently show most of her claims to be erroneous.

She also shows little evidence of reading the Intelligent Design (ID) or creationist literature, as indicated by her false claim that those "who are likely to be persuaded by ID arguments don't read scientific journals, or lengthy books about evolution, *and they never will* [emphasis in original]" (p. 1). The irony here is unmissable.

She speaks widely to colleges, universities, and sadly even churches

(although she's a rabid atheist, listed as an American Humanist Association speaker). Her focus is consistently on mocking creationists and ID supporters, as is obvious from the titles of her talks, such as "Who does the Creator like better—us, or squid?" and "Why do men's testicles hang outside the body, but elephants have their testes inside the body?" As usual, these are really pseudo-theological arguments rather than scientific ones. She spends much time on the mudskipper, which she claims ID advocates say could not exist. Her major poor design claims are reviewed below.

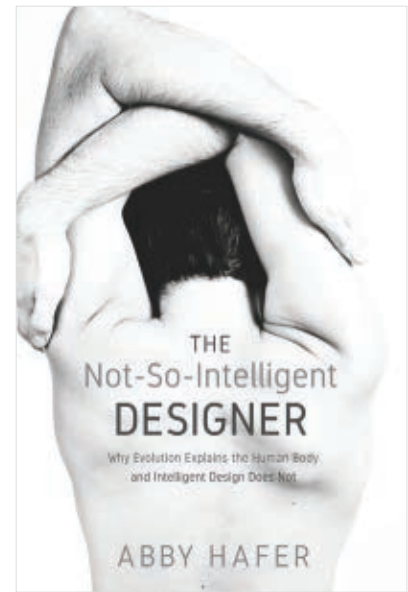
Human testicles

Her claim for human testicles is that

"... if testicles were designed, ... why God didn't protect them better. Couldn't the Designer have put them inside the body, or encased them in bone, or at least put some bubble wrap around them? Is this the best that the Designer can do?" (p. 5).

Concluding that a structure is poorly designed instead of asking why the existing design exists is a science stopper. The 'why' question motivates research into the reasons for the design. When this approach was applied to the human appendix, the tonsils, the backward retina and other examples, good design reasons for the existing design were found in all cases.

She explained that when she was looking for new approaches to refute ID she knew she "had a winner when inspiration hit me in the middle of an Anatomy and Physiology lecture ... The male testicle is a great first argument against ID" (p. 2). She then stated that when she got what she needed for a "political-style



argument", she did "what any sensible woman would do", email her minister (p. 2). As chance had it, her (Unitarian Universalist) 'church's' Darwin Day celebration was that Sunday, and her minister used the testicles example to introduce his sermon in honour of Darwin (p. 2). Her main argument is that male testicles are outside of the body, thus are prone to injury, noting that for many animals, including reptiles, the testicles are inside of the body.

If the author were to apply just a modicum of logic, though, she (and her cohort) would realise that male testicles are outside of the body for several important reasons, such as to regulate scrotal temperature for optimal spermatogenesis development.¹ When testicle temperature drops, a complex system causes the cremaster muscle to contract, which moves them closer to the warm body. When their temperature rises, the cremaster muscle relaxes, allowing them to move away from the body, insuring that their temperature is kept within a very narrow tolerance. Their temperature is also regulated by increasing or decreasing the surface area of the tissue surrounding the

testicles, allowing faster or slower dissipation of their heat.²

A major reason for their close temperature regulation is because humans are fertile year round, and most animals with internal testicles are not. Most animals need to be fertile only for short times, often when outdoor temperature allows maintenance of their proper temperature.

She also ignores the fact that testicles are a secondary sexual trait, similar to female breasts, which are also prone to injury. A parallel argument is the claim that, for this reason, the female breast is poorly designed. Therefore, because its size does not affect either milk production or breast feeding ability, it would be advantageous not to protrude from the body. However, because the baby's face is quite flat, it's advantageous that the breast protrude somewhat so the baby can get good suction. Baby mammals with snouts can suckle on flat breasts with teats. That the breast is a major female secondary sexual trait is documented by the fact that mastectomy is a very traumatic operation for most women, and reconstructive surgery is often used to normalize the breasts' appearance.

The backward retina

Seemingly oblivious to the large amount of literature documenting the critical reasons for its design, she claims the backward retina is a major example of poor design. It is said to be backward because the rods and cones do not face towards the eye's light source, but away from it. One reason for its existing design is that the photo cells must make contact with the retina pigment epithelium (RPE), which must be located at the back of the eye in order to meet the large oxygen and nutrient demanded by the photoreceptors to function properly. Rods and cones require an

enormous amount of energy for their very high metabolism and to recycle photoreceptor retinal cells.³ Due to phototoxicity damage from light, rod and cone cells completely replace themselves about every seven days. The RPE is a well-designed complex structure that enables it to serve this function.⁴ The Müller cells (radial glial cells), anterior to the retina, have both the shape and optical properties that contribute to optimizing incoming light transferal to the rods and cones by reducing light scatter,^{5,6} as well as optimizing night vision without impairing day vision.⁷ Their sensitivity is indicated by their ability to respond to a single photon.

The female birth canal

The difficulty commonly experienced in childbirth is not due to the poor design of the female birth canal as Hafer claims. The problem is that the birth canal is framed by the pelvic bones, which are only slightly larger than the typical baby's head. Actually, it is good design: the front of the pelvis is joined by cartilage between the two pubic bones, and this softens during pregnancy. Thus the opening can increase during labour, allowing most women to have a normal delivery. Problems that sometimes occur would not be unexpected in view of the Genesis Fall. The pelvis is surrounded by soft tissue, which cradles the baby like a well-feathered nest as it exits. These soft tissues also help with the rotation of the baby's head as it descends through the pubic outlet during birth.⁸

The human pharynx

Hafer also claims that the human pharynx is poorly designed because it is prone to allowing food going into the wind tube, causing choking—a flaw she claims can only be attributed to macroevolution. The fact, however,

is that the existing pharynx design allows both simultaneous eating and breathing with greater efficiency and less body bulk than if humans had two completely separate unconnected passages. The two systems are actually effectively separated, even though they have a common opening. They also function exceptionally well due to subconscious reflexes that allow them to operate without concern for most of our life. The two-system design would require two body openings and a far more complex tube and networking system, resulting in a greater likelihood for errors and problems.

A life-threatening choking event is very rare compared to the number of lifetime swallowing events, which occur about 1,000 times a day or 27,375,000 times in an average lifespan.⁹ Choking occurs mostly in children under 6 years old, eating too fast, and talking or laughing while eating.

The blood clotting mechanism

The blood condition she puts down to poor design, hemophilia, can instead be shown to be due to mutations, often of the factor VIII protein, a necessary part of the clotting system, which she elsewhere claims is not irreducibly complex. She also assumes that modern humans have evolved from a less fit animal ancestor, ignoring the fact that humans have accumulated thousands of mutations in the 6,000 years since the originally created human pair, currently estimated to be as many as 100 new mutations for each new generation. This rate is higher than the rate of somatic mutations noted below due to the many mutations that result from chromosomal abnormalities, such as non-disjunction and crossing over, and damage in the womb from teratogens and other sources. Once the egg is fertilized, genetic damage is less likely to be repaired for several reasons than in most somatic cells.

Scurvy

Contrary to her claim, scurvy is also not due to poor design, but to a lack of vitamin C (ascorbic acid) in the diet, which is not a problem for the many animals that can manufacture this vitamin, including most mammals except humans and most simians. The only simians that can produce vitamin C are lemurs and prosimians. She inadvertently notes that the problem is actually not due to poor design, but to a mutation in the genes coding for gulonolactone oxidase (GULO for short) in the final phase of vitamin C biosynthesis.¹⁰ One theory is that most simians have historically consumed enough food containing vitamin C, and when this mutation occurred, it did not interfere with their survival and was passed on without problems to their offspring. The location of the mutation is also likely a hot spot, thus is found on, or near, the same gene location in most simians.

The teeth

Hafer argues that animals which develop numerous sets of teeth have an advantage over humans, who develop only two sets, the baby and adult teeth. She argues that if humans had many sets of adult teeth they could shed the bad ones and constantly renew their teeth. She ignores the research that found diet and genetic factors, as well as poor dental hygiene practices, are strongly implicated in the problems that some humans have with tooth decay. Only a few types of bacteria cause tooth decay, and the oral cavity bacteria composition varies, as does the saliva composition; thus, some people have many cavities, others few or none, even if their diets and environments are similar. In short, tooth problems are not due to poor design but can be demonstrated to correlate to ignoring essential hygiene in the majority of cases. With proper care, adult teeth almost always last a lifetime.¹¹

The genome

The author argues that the human genome is poorly designed based on the existence of mutations, which she claims is due to “our genome’s tendency to get its copying wrong” (p. 175). In fact, DNA replication is extremely accurate, partly due to the dozen or more proof-reading systems and the editing ability of numerous enzyme systems. As a result, it is estimated that, due to the DNA repair system, only 1 in every ten billion bases is incorrect when DNA is copied after the repairs are made.^{12,13}

The appendix and other claims

As an anatomy professor, she should know that this important organ is not poorly designed or vestigial as she claims (pp. 177–181) but serves at least five important functions. One newly discovered example is that it is used as a safe house for probiotic bacteria, which allows GI tract probiotic bacteria to be replaced within a few hours after the use of antibiotics or after diarrhoea flushes them out of the system. She disputes this conclusion based on the incorrect claim that antibiotics also usually kill the bacteria in the appendix. She also claims that most people who take antibiotics do not have problems, which may be true due to the function of the appendix or the advice of the person’s doctor to consume foods, such as yoghurt, to replace the lost bacteria. Rather than just assert this claim here, she should publish her conclusions in peer-reviewed literature (that’s what they usually tell creationists¹⁴)! Also, she seems to be unaware of one problem: antibiotics can sometimes kill probiotic bacteria that normally keep the dangerous *Clostridium difficile* bacterium at bay. Patients without appendices are four times more likely to contract this infection.¹⁵

Hafer also claims the coccyx bone is a remnant of our tail left over from

our evolutionary ancestors (p. 179). However, it is an important muscle, tendon, and ligament attachment point, demonstrated by the necessity for surgeons to consider these attachments when operating on the coccyx. Last, she incorrectly claims that the arrector pili muscle is vestigial (p. 180). In fact, it has several important functions, including heat production and lubrication of the skin.¹⁶

Irreducible complexity

Hafer has a section on irreducible complexity, concluding that, in essence, nothing is irreducibly complex. The reader might be forgiven for wondering here if she even has a basic understanding of what irreducible complexity actually is—namely, if any system requires all of its parts to function, it is, by definition, irreducibly complex.¹⁷

Conclusions

The main focus of the book is to discredit ID. Hafer quotes the ID wedge document that says “Design theory promises to reduce the stifling dominance of the materialist worldview, and to replace it with a science consonant with Christian and theistic convictions” (p. 8). She then claims that materialism means “scientific facts”, and that ID supporters “want to squash science as a method of investigation, which obtains facts about the material world by investigating it using material means” (p. 8). Of course, this claim is a gross distortion. By ‘materialist’, ID supporters mean the dominance of materialism to the extent that suppression of non-materialist ideas now dominates science.

Hafer irresponsibly concludes that “ID is very well funded, well organized, very determined, and they want to indoctrinate American children and American society with their antiscientific rubbish, at taxpayer



Figure 1. Wisdom teeth are often considered poor design or even vestigial. The problem, though, is mainly due to overcrowding, as shown in this picture, and typically due to our soft Western diet. In addition, genomic degeneration has also played a role in producing less than perfect teeth and other structures as well.

expense” (p. 8). She then concludes, “the only thing ID proponents have in common besides, in many cases, fat paychecks from the Discovery Institute, is that they insist that their version of reality must be taught in public schools at taxpayer expense” (p. 10). If she was conversant with ID literature, she would know that they not only do not “insist that their version of reality must be taught in public schools” but openly oppose forcing teaching ID in government schools. This falsifies Hafer’s claim that what ID supporters

“... are really trying to do is teach their particular religion in American public schools at taxpayer expense. They pretend that it’s science, but by their own admission, their stated goal is to destroy science. They wish to insert their religion into public schools, so that all children are indoctrinated with their religion. All paid for by American taxpayers” (p. 10) [Apparently coercing tax dollars to support atheistic evolution is OK].

She asserts that “ID proponents want everyone in the US, by way of public schools, to be taught that the actual facts about the material world don’t exist, or shouldn’t. Instead, they simply want to tell you what you have to believe, regardless of any factual basis. In other words, if they invent it, you have to believe it” (p. 7).

She concluded that when ID supporters attack evolution, it “... is simply their way of getting into the American school system. They try to convince politicians that what they are saying is science, not religion, so that then they can force their way into American public education, and then expand from there. They see this as a political fight, and are using political means to fight it” (p. 7).

These quotes illustrate the rabidly irresponsible name-calling that dominates her book. I have read over 100 anti-ID and anticeation books, and this book is, without question, the worst and the most irresponsible. Most of her sources are from anticeation and anti-ID literature, where she uncritically repeats numerous carefully refuted claims. I read this book to better understand the opposition to ID, but when over 70% of it is irresponsible invective (I am forced to stress that) to refute a movement, you would think the author would have carefully read the material which that movement produces and respond to it in an informed way. This she has not done.

References

1. Werdelin, J. and Nilsson, A., The evolution of the scrotum and testicular descent in mammals, *J. Theoretical Biology* **196**(1):61–72, 7 January 1999.
2. Van Niekerk, E., Vas deferens—refuting ‘bad design’ arguments, *J. Creation* **26**(3):60–67, 2012; creation.com/vas-deferens.

3. Bergman, J. and Calkins, J., Why the inverted Human Retina is a Superior Design, *Creation Research Society Quarterly* **45**(3):213–224, 2009.
4. Hewitt, A.T. and Adler, R., The retinal pigment epithelium and interphotoreceptor matrix: structure and specialized functions; in: Ryan (Ed.), *The Retina* 2nd edn, Mosby, St Louis, MO, p. 58, 1994.
5. Franze, K. *et al.*, Müller cells are living optical fibers in the vertebrate retina, *PNAS* **104**(20):8287–8292, 2007.
6. Sarfati, J., Fibre optics in eye demolish atheistic ‘bad design’ argument, *Creation* **31**(1):45–47, 2008; creation.com/fibreoptic.
7. Labin, A.M. *et al.*, Müller cells separate between wavelengths to improve day vision with minimal effect upon night vision, *Nature Communications* **5**:4319, 8 July 2014 | doi:10.1038/ncomms5319.
8. Warrener, A.G. *et al.*, A wider pelvis does not increase locomotor cost in humans, with implications for the evolution of childbirth, *PLOS One*, 11 March 2015 | doi:10.1371/journal.pone.0118903.
9. Bergman, J., Is the human pharynx poorly designed? *J. Creation* **22**(1):41–43, 2008; creation.com/pharynx.
10. Truman, R. and Terborg, P., Why the shared mutations in the Hominidae exon X GULO pseudogene are not evidence for common descent, *J. Creation* **21**(3):118–127, 2007.
11. Bergman, J., Are wisdom teeth (third molars) vestiges of human evolution? *J. Creation* **12**(3):297–304, 1998.
12. Reece *et al.*, *Campbell Biology*, 9th edn, Benjamin Cummings, pp. 316–318, 2010.
13. Kunkel, T.A., DNA Replication Fidelity, *J. Biological Chemistry* **279**(17):16895–16898 | doi:10.1074/jbc.R400006200.
14. Although see Kulikovskiy, A.S., Creationism, Science and Peer Review, *J. Creation* **22**(1):44–49, 2008; creation.com/peer.
15. Im, G.Y. *et al.*, The appendix may protect you against *Clostridium difficile* recurrence, *Clinical Gastroenterology and Hepatology* **9**:1072–1077, 2011 | doi: 10.1016/j.cgh.2011.06.006.
16. Bergman, J., Are goose bumps evolutionary leftovers? *Creation Matters* **21**(5):4–5, 2016. Bergman, J. and Howe, G., “*Vestigial Organs Are Fully Functional: A History and Evaluation of the Vestigial Organ Origins Concept*,” Creation Research Society, St Louis, MO, 1990.
17. Bergman, J., Evolution and Irreducible Complexity, *J. Interdisciplinary Studies* **22**(2):89114, 2010.

The total bankruptcy of so-called theistic evolution

Shadow of Oz: Theistic evolution and the absent god

Wayne D. Rossiter

Pickwick Publications, Eugene, OR, 2015

John Woodmorappe

The author is an Assistant Professor of Biology at Waynesburg University. Rossiter appears to have had a roller-coaster experience in terms of faith. He claims to have once been a Christian, then renounced the faith, and become an atheist (p. 1). He describes his atheism as having been of a cantankerous kind (p. 3). Years later, he professedly became a Christian after experiencing a bout with near-death (p. 4).

Throughout this work, the author engages in a systematic debunking of so-called theistic evolution. He also deconstructs the positions of oft-quoted evolutionists, such as Francisco Ayala, Richard Dawkins, Karl W. Giberson, Kenneth R. Miller, Pierre Tielhard de Chardin, and Howard van Till.

For purposes of this review, I compare some of the author's contentions with those found in my tale of the horse and the tractor, wherein the farmer (theistic evolutionist) is vainly trying to assign a role to the horse (God) in the movement of the tractor (evolution) (figure 1).¹ First the farmer insists that the roles of the horse and the tractor can be reconciled by having the horse pull the tractor and then, faced with the fact that the tractor runs on its own and needs no horse to move

it, insists that the horse is invisibly behind the motions of the tractor.

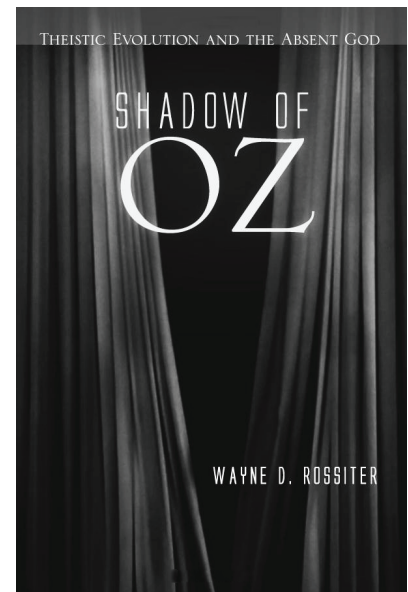
The contrived 'reconciliation' offered by so-called theistic evolution

The gist of theistic evolution is deftly summarized by Rossiter:

"So then how does the theistic evolutionist marry evolutionary processes and theism? As I have already mentioned, there are three basic ways; 1) they adjust Christian claims so that they fit snugly around an unharmed evolutionary core, 2) they create artificial firewalls between their scientific and theological beliefs, or 3) they push God into the distant and undetectable cosmic background so that the universe only looks random (but isn't). In general, the difficulty for theistic evolutionists lies in trying to make sense of 'In the beginning God created ...'. Namely, they are not able to say what 'creating' God actually did, and they are absolutely reluctant to implicate his divine hand in any particular happening with regard to life on Earth. God is an assumed ethereal backdrop, as opposed to an evidenced player in the workings of the universe" (p. 17).

Theological language aside, so-called theistic evolution is really no different from atheistic evolution. Rossiter comments:

"It's a one-sided push. Why? As we shall see, this is because theistic evolutionists are persuaded to make room in their theology for Darwin, but not room in their Darwin for theology (figure 2). ... Naturally, when the two disagree, the facts will necessarily carry the day, or the faith claims are



simply compartmentalized, and the conflict is not acknowledged" (p. 6).

In addition:

"For example, while names like Kenneth Miller and John Haught are used as evidence of the happy marriage between God and Darwin, their actual theology bears little resemblance to the Christianity they claim" (p. 9).

Clearly, the role of God in so-called theistic evolution is vague, untestable, and totally ad hoc. Rossiter writes: "The point is that theistic evolution has moved the discussion such that anything science finds out about the natural world can be interpreted as God's plan" (p. 160).

The 'God in evolution' is indistinguishable from a non-existent God. This can be illustrated by Carl Sagan's tale of the dragon in the garage (figure 3). The dragon is invisible. The dragon floats, so it cannot leave footprints. Its fire is heatless. Finally, it is incorporeal, so paint cannot stick to it (p. 57).

In a sense, theistic evolutionists want to have it both ways, and Rossiter calls it a form of intellectual dishonesty (e.g. p. 104). That is, theistic evolutionists embrace naturalistic

evolution as fact, while simultaneously denying the naturalistic implications of naturalistic evolution.

Of course, there are other implications of so-called theistic evolution. For instance, the theistic evolutionists who speak of ‘tolerance’ of different views about Genesis are not infrequently the most intolerant of all. Although Rossiter rarely gets into theology in this book, he does note the inconsistency of Christian theistic evolutionists who embrace naturalism for the first part of the Bible but not

its latter part (the miracles of Jesus Christ).

The ‘pre-scientific’ role of miracles

One common argument for the non-literalness of the Book of Genesis is the fact that it was written, by pre-scientific authors, living in a pre-scientific age, for pre-scientific readers, and for the purpose of teaching great truths. Therefore, according to the likes of Kenneth R.

Miller, the biblical teachings should be ‘updated’ to fit what is called modern science.

The foregoing argument confuses the issue, as shown by Rossiter:

“By analogy, I can tell you that it rained last Tuesday, and, while I have no training in meteorology, my claim should be consistent with reality. Perhaps the meteorologist can explain the specific details of how and why it rained, but that should only reinforce my claim, not debunk it. And this is what the theistic evolutionists are really doing. They are not just claiming that the biblical authors of antiquity were ignorant of science (as they most certainly were), but that they were wrong about reality” (p. 63).

Theistic evolutionists also circumvent Genesis through another foil. They commonly say that the role of a miracle-working God, if any, in nature is outside the realm of science. Rossiter points out that they are being a bit disingenuous, and are engaging in their own version of the God-of-gaps argument. He comments:

“It is untrue that science has nothing to say about miracles. If a man

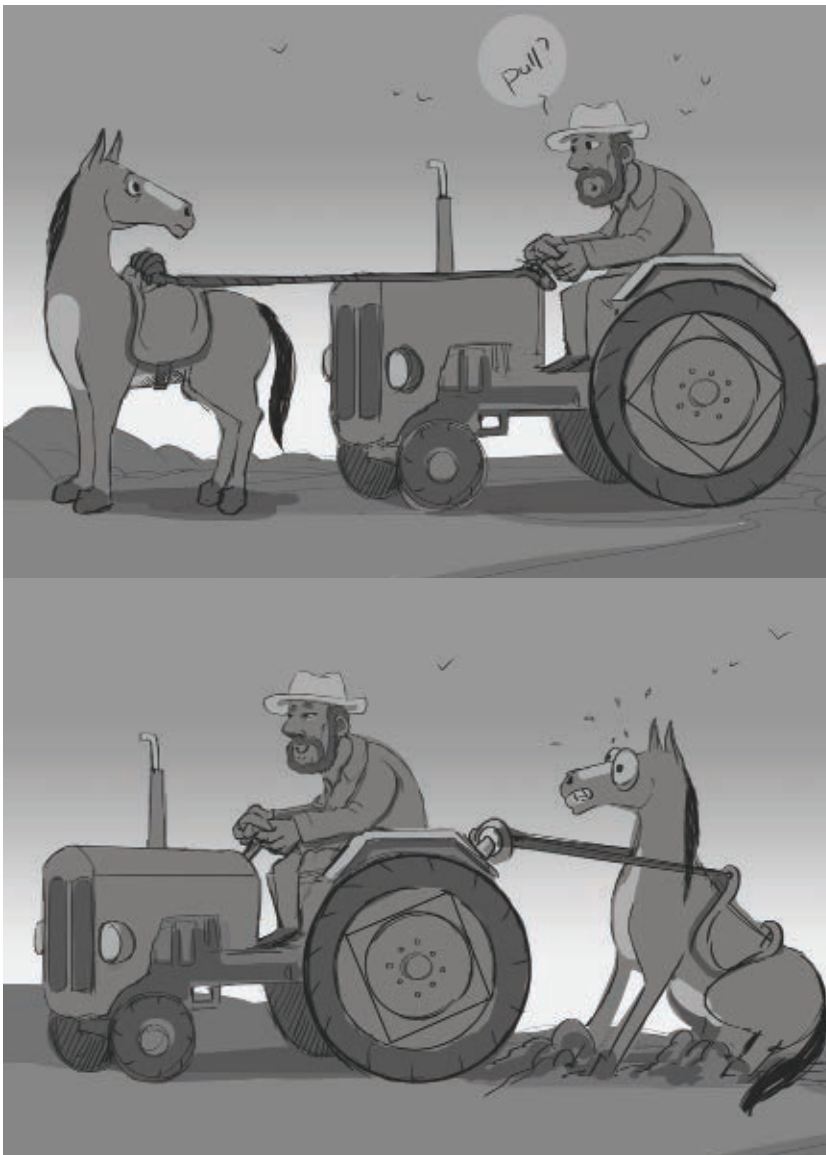


Figure 1. Tractor and Horse



Figure 2. Theistic evolutionists are persuaded to make room in their theology for Darwin, but not room in their Darwin for theology.

is spontaneously (miraculously) healed of a deadly virus while lying on his deathbed, doctors (and scientists) can document it. He had the virus, they knew his condition, and now he doesn't. Of course we may not know why or how, but we can document and study it" (p. 79).

God, evolution, and non-miraculous events

Having rejected a miraculous origin of the whole universe, as taught in the Book of Genesis, theistic evolutionists are quick to assure us that God can work through non-miraculous events. Here, too, they are being disingenuous. Evolution is completely non-teleological. Not only does evolution have no place for miracles—it also has no place even for non-miraculous divine intentionality. Rossiter makes this very clear:

"Saying that God used evolution to create humankind (or anything in particular) is like saying that Suzie used the lottery to give her uncle a million dollars. If she did, then the lottery was clearly non-random. Evolution cannot plan, prepare for, or respond to any future events. Further, its principle [sic] driving mechanism (natural selection acting on heritable variation) can only sort organisms based on fitness in the present. Because fitness is the only metric in natural selection, evolution is rendered an amoral process that does not care *how* the fitness is achieved [emphasis in original]" (p. 44).

Taking this further, Rossiter criticizes the position taken by Joan Roughgarden, in which, among other things, God imposes natural selection on the organism:

"However, natural selection—whatever it actually is—is the product of the environment the organism finds itself in. ... What's worse about Roughgarden's argument is that it is clearly a God-of-the-gaps. She is

inserting God's intentionality and direction into a system that shows no signs of such divine activity. The evolutionary processes she affirms and espouses are precisely the same as the secular versions" (p. 51).

All of the foregoing is illustrated, in my tale of the horse and the tractor (figure 1),¹ by the following elementary fact: The tractor runs on its own without the horse, and the horse has no role of any kind in the motion of the tractor. However, if the tractor does not run, then it is futile to force the horse to pull the tractor. So, if evolution works, it does not need God, and, if it does not work, it is futile to force God to be the driving force behind evolution.

Is God hidden in the 'potentiality' of evolution?

Some theistic evolutionists have suggested that God did not create things directly, but that He endowed them with some kind of 'ability to evolve'. Rossiter demolishes this contention with the following quip:

"The argument is that God so brilliantly conceived of his creation at its inception that he didn't interact with it again. But, because of the inherent stochasticity of the universe, pointing to God's preconceived plan

in the potentiality of the universe is more like saying that my wife and I designed our child from her inception such that she would become a tea drinker at age fifty-eight" (p. 14).

Let us extend Rossiter's reasoning itself. Every single aspect of evolutionary thinking revolves around the unintentionality of the process, and that at *every* level. Thus, the 'potential to evolve' is every bit as unplanned as the evolutionary process itself. For example, if a given species escaped extinction by evolving into a novel life-form, it was not because of some built-in 'potential to evolve', any more than it was because of some predetermined plan or outcome. It was because the right mutations fortuitously happened, and because the environment fortuitously happened to be of the right kind that enabled the presumed evolutionary process to give rise to a particular novel organism.

Let us once again extend my story of the horse and the tractor.¹ Imagine the futility of the farmer saying that the horse is actually moving the tractor insofar as the horse somehow has endowed the tractor with 'the potential to move'. First of all, it would confuse the issue—which is not some vague 'potential to move', but the fact of the tractor moving, and the purported



Figure 3. Carl Sagan's dragon in the garage

role of the horse in making the tractor move. Second, it would expose the problem of the fact that there is no evidence that the horse had anything to do with the tractor having a potential to move.

Finally, and not mentioned by Rossiter, the notion that God made things with the ‘potential to evolve’ confuses the issue. It redefines ‘creation by God’ to mean something that it is not. The Bible plainly speaks of a direct creation of all things, not some kind of mystical ‘ability to create itself’.

God-of-gaps in quantum phenomena

Faced with the fact that evolutionary theory has no role for God whatsoever, some theistic evolutionists try to smuggle God into the indeterminacy of the actions of matter at the subatomic level. Rossiter brilliantly demolishes this escapade with the following:

“A few theistic evolutionists assume a different fallacious point shared by Miller. Folks like [John M.] Polkinghorne and [Stephen M.] Barr join him in positing that the God we’re searching for might be acting through quantum phenomena, which is a contradiction in terms. We’ve already demonstrated that it is easy to discern between the patterns of evidence or intentionality and random stochasticity. While they ridicule creationists for trying to use God to fill the temporary gaps in scientific knowledge, they commit precisely the same mistake. In their current stance, they have relegated God to an invisible and undetectable role on the very outskirts of the material universe (before the beginning and in the subatomic static). If those gaps are decisively filled, where will God go?” (p. 162).

Let us extend my story of the horse and the tractor.¹ One could just as easily assign the horse an invisible role,

in making the tractor move, by asserting that the horse’s actions somehow occur at the quantum level. It would be just as logical as giving God that role in evolution.

There is a further irony to this. Although Rossiter rejects Intelligent Design (ID), he chides theistic evolutionists for despising the proponents of ID, and for misrepresenting the ID position. However, those theistic evolutionists who, in Rossiter’s words, say that “God pulled the puppet strings”, at the quantum level, are, in a sense, invoking a form of ID themselves (pp. 54–55)!

‘But God cannot absolutely be ruled out’

Some theistic evolutionists, failing everything else, tell us that we cannot be certain that God is not behind the evolutionary process. However, Rossiter points out that this is like saying that, since an accused person cannot be proven to have been uninvolved in a murder, that he is therefore guilty. In a more subtle sense, it is also like saying that, since we cannot be absolutely certain that a certain random number is in fact random, we are therefore free to suppose that it was non-random.

Let us again extend my story of the horse and the tractor.¹ One could just as easily argue that the horse is causing the tractor to move, perhaps by some undefined telepathic process, because, after all, we cannot absolutely prove that the horse lacks the telepathic ability to influence the tractor.

Finally, this whole theistic evolutionist’s reasoning process is completely arbitrary, as pointedly illustrated by Rossiter:

“We don’t look at isotopic decay as a guided process. We don’t presume that God is expressing his intentionality during the diffusion of ions in solution, Brownian motion, or even the timing and choosing of rock particles lost to erosion. As we’ve seen before, special mental

gymnastics are applied by theistic evolutionists to evolutionary theory alone. Publicly entering the fray to defend the view that Brownian motion is directed by God is apparently not a hill worth dying for” (p. 93).

Circular reasoning in evolutionary storytelling

This book is not solely about so-called theistic evolution. It also includes a valuable critique of some of the premises of organic evolution.

Wayne D. Rossiter delves into the hidden circle of assumptions behind the standard evolspeak, as, for example, concerning the emergence of animals to fill ecological niches:

“Which came first, the niche or the organism’s ecology? That is, are niches defined as opportunities lying in wait for animals to adapt to fill them, or are niches things that define the organisms themselves?” (p. 136).

He continues:

“How do we know if there’s a selective pressure (or even what it is)? By the adaptive response. What’s an adaptation? A response to a selective pressure. The recurring problem of circularity just keeps rearing its head” (p. 136).

Conclusions

Theistic evolution is a grand failure. It is internally inconsistent—and that at several different levels. It borders on intellectual dishonesty—again at several levels.

The facts are clear: the biblical God and evolution are fundamentally incompatible.

References

1. Woodmorappe, J., The horse and the tractor, *Creation* 22(4):53, 2000; creation.com/horsetractor.

Hitler the evolutionist; Hitler the pantheist (Hitler the atheist—Yes)

Hitler's Religion: The twisted beliefs that drove the Third Reich

Richard Weikart

Regnery History, New York, 2016

John Woodmorappe

The author is a well-authored historian. He is Professor of Modern European History at California State University, Stanislaus. He is the author of five books, and has published scholarly articles in *German Studies Review*, *Journal of the History of Ideas*, and other journals. His work has been featured in various media outlets.

The author provides a rigorous analysis of Hitler's understanding of 'God'. He also examines all the arguments for and against the different ideas about Hitler's religious beliefs, or lack of them. Pointedly, Weikart warns against taking isolated statements of Hitler in order to draw conclusions about his beliefs. Instead, one must look at the *main* themes of Hitler's pronouncements, and with greater weight to his private than his public comments.

The public Hitler and the private Hitler

What politicians say, and what they actually think, are often very different. Not surprisingly Hitler, dealing with a German nation that was still largely—if only culturally—Christian, also called himself a Christian. For the same reason, Hitler periodically invoked Christian themes, and generally refrained from

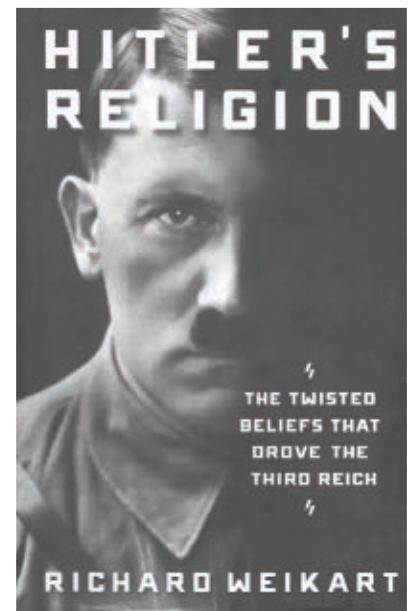
publicly making harsh statements about Christianity. Furthermore, some Nazis, including Hitler, retained church membership even if they did not believe.

In private, Hitler often verbalized his hostility to Christianity and the church. However, Weikart warns of the fact that Hitler often told people, of his circle, what they wanted to hear. For instance, owing to the fact that Martin Bormann, Hitler's personal secretary, was a hard-core atheist, it would hardly be remarkable if Hitler would posture as an atheist in discussions with Bormann.

On the other hand, Weikart's warning appears to be an overreach in other contexts. Hitler told Christa Schroeder, his personal secretary, that the church was an outdated and stifling institution. Hitler also told two of his close and high-ranking associates, Otto Strasser and Walter Schellenberg, that he did not believe in God. It is not at all clear why Hitler would think that these officials 'wanted to hear' that he was a church rejecter and an atheist. If anything, the exact opposite was the case. Note that Otto Strasser broke with Hitler, already in 1930, because Strasser believed that, without Christianity, Europe was lost, and because Hitler was an atheist (p. xi). Now, if Hitler was indeed consistently telling his close associates 'what they wanted to hear', he would have told Strasser that he was a devout Christian, and certainly not that he was an atheist!

'God' can mean many different things

In the West nowadays, most people are biblically illiterate, and have many different conceptions of 'God'. An atheist can even quip



that: "I believe in God, because God is humanity's greatest invention." However, this is nothing new. Even in 19th- and 20th-century Europe, there were many different notions of 'God', many of them quite at variance with the biblical teachings about Him. There were a number of reasons for this. For one thing, owing to the residual strength of theism, those who rejected God usually preferred to redefine Him rather than disavow Him openly. Second, the development of higher criticism and modernism, both pioneered in Germany, made it quite facile to de-literalize God and Christian elements. For example, the anticipated 'Second Coming of Christ' became repackaged as one's personal devotion to Christ at the time of one's death. This de-literalization and contrived flexibility of God and Christian elements, in turn, made it easier to co-opt them, under decidedly unconventional new meanings, for the purposes of what eventually became Nazi ideology.

Apart from the deliberate attempts to mislead the German people, it is unremarkable that Hitler sometimes inadvertently lapsed into Christian terminology, that he mixed Christian and Nazi memes, and that he

occasionally even seemed to hold Christian beliefs. After all, Hitler had been raised Christian. Weikart does not mention this, but one can think of famous American militant atheist Madalyn O'Hair, who indicated that, decades after having stopped believing, she could recall some Christian hymns in detail.

Owing to all the foregoing reasons, it is not surprising that Hitler's statements about God seem contradictory. Still less surprising is his idiosyncratic reuse of theistic and Christian terminology for his own purposes. Let us examine some of them.

Who (or what) was 'God' to Hitler?

Hitler frequently used the words 'providence' and 'almighty', but he was actually referring to fate. Such was the conclusion of fellow Nazis Alfred Rosenberg and Hans Frank, who were hanged at Nuremberg. (I recall that, when I first read *Mein Kampf* as a teenager decades ago, I was struck by Hitler's frequent allusions to fate.) There are other Nazi usages of 'god', not mentioned by Weikart, and these are in the sense of blood and race.¹

At times, however, Hitler did make it sound as though he believed that history had been predetermined. However, this does not imply theism, at least not necessarily. In fact, it is not uncommon for people, especially when in a desperate situation, to imagine some sort of predetermined outcome, involving God or not involving God, where there is none. One obvious example, not mentioned by Weikart, involves Hitler's reaction to the news of the death of American President Franklin D. Roosevelt in April 1945. Hitler deluded himself into concluding that 'God' had intervened on Nazi Germany's behalf in the last minute, causing the impending collapse of the Allied war effort, and thereby enabling Germany to snatch victory from the jaws of defeat.

Most of the time, when Hitler prayed, he did it in the sense that the one praying would be inspired to solve his own problems. (Nowadays, this is often verbalized as 'God helps those who help themselves'.) At other times, however, it superficially seemed that Hitler was indeed praying, to a personal god, for deliverance. However, it is not rare for even atheists to pray to God when in difficult situations, wherein we get the saying that 'there are no atheists in foxholes'. One might also think of the parallel Polish proverb, "*Kiedy trwoga to do Boga*" (when people are in fear, they turn to God).

Incredibly, some commentators have not only argued that Hitler was a theist, but also that he was a creationist—all because he sometimes referred to a creator of the universe. A close analysis of Hitler's usage of this term disposes of this silly claim. In his infamous *Mein Kampf*, Hitler uses 'creator' with reference to nature. This is also consonant with his deification of nature in many other contexts. So when Hitler spoke that man was made 'in the image of the creator', he meant that man was made in the image of deified nature.

Hitler was no Christian

At times, Hitler spoke that Jesus was 'his lord and saviour', and that he was 'fighting for the work of the lord'. In context, it is obvious that Hitler was referring to deified nature. Weikart adds that, in Hitler's twisted thinking, Jesus was the saviour in the sense that He came to save the world from the Jews. Hitler thought that Jesus Christ had stood up to the Jews and their avarice and materialism and, for this reason, the Jews had Him put to death.

There is no way that Hitler could have been a Christian as conventionally defined. Hitler entirely rejected the miraculous. Furthermore, Hitler rejected all the Christian doctrines, including the resurrection of Jesus Christ, and disbelieved in an afterlife

(except in the redefined sense of the persistence of the *Volk*), even weeks before his suicide.

The pattern of Hitler's thinking is unmistakable. Weikart concludes that, "Most historians today agree that Hitler was not a Christian in any meaningful sense" (p. 69).

Hitler the pantheist / Hitler the atheist

Author Weikart suggests that Hitler's frequent usages of the term 'god' mean that Hitler cannot be considered an atheist. So what term best describes Hitler's beliefs? Weikart concludes that Hitler is best understood to be a pantheist—a conclusion also reached earlier by several investigators.

Let us take a closer look at this. The pantheist believes that 'everything is god'. Now, if everything is god, it means that nothing in particular is god. It also certainly means that no personal, transcendent Supreme Being exists. This, by definition, is atheism. As Christian apologist and legal scholar John Warwick Montgomery pointed out:

"Pantheism ... is neither true nor false; it is something much worse, viz., entirely trivial. We had little doubt that the universe was here anyway; by giving it a new name ('God') we explain nothing. We actually commit the venerable intellectual sin of Word Magic, wherein the naming of something is supposed to give added power either to the thing named or to the semantic magician himself."²

Such was also the conclusion of Artur Schopenhauer, a philosopher widely read, and admired, by Hitler (figure 1). Therefore, and contrary to Weikart, Hitler indeed was an atheist.

Modern definitions of atheism only reinforce this point. In the past, atheism was usually understood as a conscious and deliberate decision to disbelieve the existence of God. Nowadays, however, merely an absence of belief in God suffices to

make one an atheist (in a self-serving definition to remove their burden of proof). On this basis, it is said that every child is born an atheist, and remains so unless or until he or she is indoctrinated in belief in God. (Actually, research shows that children's default position is to see the world as design, and indoctrination is needed to reject that.³) Since Hitler had an absence of belief in a personal, transcendent supreme being, he was, by the new definition, an atheist.

Hitler, the occult, and neo-paganism

There is, first of all, no contradiction between being an atheist, and being involved in the occult or in neo-paganism. In fact, being an atheist does not mean that one believes in nothing. It means that one can believe in anything (except God, of course).

Weikart does not support the importance of the occult in Nazi thinking. He points out that the early, proto-Nazi racist movements in Germany *intersected* with mysticism and the occult, but were not centred on them. The same can be said of Hitler. He had books on the occult in his library, and at least once engaged in dowsing, but there is no systematic body of evidence that Hitler was deeply involved in the occult. As for other leading Nazis, Hess and Himmler showed a sustained interest in the occult, while Goebbels and Bormann frowned upon the occult. Around 1941, the Nazis banned many public manifestations of occultism, including astrology, spiritism, theosophy, and parapsychology.

The author's downplaying of the occult, in Nazi attitudes and actions, may be excessive. In fact, the Nazi outlawing of public occult practices does not necessarily mean that Nazism was anti-occult. The Nazis may have actually opposed the public's use of the occult for elitist reasons: they wanted to monopolize the occult power for themselves, and not share it with the

unwashed masses. In addition, the Nazi authorities perhaps feared that widespread public use of the occult could become an end in itself, thus reducing the hold of Nazi ideology upon the minds of the masses. (Note that this parallels the accusation of many occultists, who assert that the real reason that the church opposes the occult owes to the fear that the masses could come to feel that they can develop their own private spirituality, and that they no longer needed the church or its institutions.)

Support for the premise that the Nazis wanted to monopolize the occult, and not eliminate it, is found in the actions of Heinrich Himmler. Weikart quips:

"One of the more bizarre aspects of this anti-occult campaign is that it was directed by Himmler's police forces, despite Himmler's own fascination with the occult. Indeed, Himmler released the astrologer, Wilhelm Wulff, from custody, under the condition that he ply his occult art for Himmler. Thus he became Himmler's personal astrologer at the same time other

astrologers were being persecuted" (p. 192).

All in all, Weikart downplays the neo-pagan aspects of Nazism. Again, it appears that Nazism *intersected* with Nordic neo-paganism, but was not centred on it. As with the occult, there was no monolithic Nazi position on this subject. Rosenberg and Himmler wanted to resurrect ancient Germanic gods, rites, and shrines, while Hitler did not. The rationalist side of Hitler came to the fore (pp. 189–190). This meant that modern science and reason was what should animate the German people, and not a return to long-defunct habits. In addition to this, Hitler believed that Nazism should stress action, and not contemplation and mysticism.

Finally, since neo-paganism was repulsive to many Germans, Hitler had the following tactical reason for distancing himself from neo-paganism: It was unnecessarily divisive of the German people. In fact, Weikart could have made this consideration stronger by pointing out that Munich Bishop Michael von Faulhaber, who had a relatively good standing with Hitler, had been emphasizing the dangers of Nazi neo-paganism to German Christendom.⁴

PANTHEISM IS ONLY A POLITE FORM OF ATHEISM



ARTHUR SCHOPENHAUER

Figure 1. Author Weikart identifies Hitler as a pantheist. However, semantics aside, pantheism is indistinct from atheism. Such is also the conclusion of famous atheists, such as Arthur Schopenhauer and Richard Dawkins. Therefore, Hitler was an atheist.

Hitler was unquestionably an evolutionist

A commentator has argued that *Entwicklung* can mean development, and not evolution and, on this slender reed, tries to undermine Hitler's belief in evolution. (Not mentioned by Weikart, the English word evolution can also have multiple meanings—for example, the evolution of gases in a chemical reaction—even though it normally refers to organic evolution unless it obviously does not. And its Latin root *ēvolvere* means to unroll, unfold, or expand out. Note that Darwin himself didn't use the word in his *Origin of Species* until the very last word.) The usage, in each case, depends upon context. In addition,

the default meaning of *Entwicklung* is in fact organic evolution, as had been the usage of this term by German biologists of the 1920s and beyond (pp. 227–228). Thus, claims that *Entwicklung* had fallen into disuse in the late 19th century, as a term meaning organic evolution, are totally fallacious.

Now consider the context of Hitler's pronouncements. It seals the deal. In his *Mein Kampf*, and in the chapter "Nation and Race", Hitler was obviously using *Entwicklung* in the sense of organic evolution. He could not possibly be referring to embryological development. Weikart elaborates:

"Hitler has just described a struggle between living organisms that leads to the victory of the stronger and the elimination of the weaker. In that context, what would the 'higher development of organic beings' mean? 'Higher development' certainly implies that a change is transpiring. Further, just two paragraphs later, Hitler maintained the 'struggle is always a means for improving a species' health and power of resistance, and, therefore, a cause of its higher development (*Hoeherentwicklung*).' Again, 'improving' a species and bringing about its 'higher development' is not a language of one committed to a fixity of species. Hitler used the term 'higher development' (*Hoeherentwicklung*) yet again in the following paragraph when discussing biological organisms. Thus, even if we do not translate *Entwicklung* as 'evolution', it is still clear that evolution is exactly what Hitler meant" (p. 227).

Even stronger, in this regard, is the Nazi government's manual on the official biological curriculum. It requires an "overview of the *Entwicklung* of life in the course of geological history" (p. 228). So *Entwicklung* is something that is taking place over the course of geologic time. Without a shadow of a doubt, this term can only be referring to organic evolution! In addition, this element of the official curriculum in

Nazi Germany debunks the bizarre argument that the Nazi regime had outlawed the teaching of organic evolution. Precisely the opposite is the case.⁵

Hitler left no doubt that he did not believe in any form of Adam and Eve. Exactly the opposite was the case. Weikart comments:

"As always, Hitler stressed that humans were no exception to the laws of nature. He stated, 'In the process of evolution humans arose, just like animals, and their vocation was struggle for their existence.' In a speech later that year, Hitler again expressed his belief that humans were descendants of animals. ... Hitler thus thought that the forefathers of humans were animals and humans would still be animals if they had not been elevated by the struggle for existence" (p. 234).

Hitler uses evolution as a rationalistic weapon against Christianity

Hitler was not only an evolutionist, but also one who eagerly repeated the standard old atheist arguments against theism. Weikart comments:

"On October 24, 1941, Hitler spoke at great length to his entourage about the controversy between science and religion, and specifically between evolution and Christianity. Hitler opened this lengthy monologue by claiming that the church's teachings are contrary to modern research. In fact, as Hitler expounded on this science-religion controversy, he clearly came down on the side of science and bashing the church. ... In addition, Hitler praised the French Enlightenment thinkers' anticlericalism and the progress of science. After expostulating on the glories of science and the ignorance of the church, Hitler pronounced his belief in the evolution of humans. ... Hitler clearly accepted evolutionary theory, including human evolution,

and rejected religious teachings to the contrary. Nor was this an isolated statement. ... Two other associates of Hitler testify that belief in Darwinian evolution was integral to his ideology" (pp. 224–225).

Conclusions

The preponderance of evidence is clear: Hitler was not a Christian. Isolated statements by Hitler to the contrary, and then said mostly for public consumption, do not invalidate this conclusion.

Weikart rejects the notion that Hitler was an atheist, and instead identifies Hitler as a pantheist. However, owing to the fact that pantheism and atheism are functionally identical, it follows that Hitler was indeed an atheist, Weikart notwithstanding.

There is no doubt about the fact that Hitler was a convinced evolutionist. Moreover, Hitler used evolution as a rationalist-style weapon against Christianity.

References

1. Coole, W.W. and Potter, M.F., *Thus Spake Germany*, G. Routledge & Sons Ltd, London, 1941.
2. Montgomery, J.W., *The Suicide of Christian Theology*, Bethany, Minneapolis, MN, p. 252, 1975.
3. Brooks, M., Natural born believers, *New Scientist* 201(2694):31–33, 7 February 2009.
4. Faulhaber, M., *Judaism, Christianity, and Germany*, MacMillan Company, New York, 1934.
5. Elsewhere Weikart has explicitly refuted that charge: Was Darwinism Banned from Nazi Germany? *Evolution News*, evolutionnews.org, 21 November 2016.

New Old Testament survey criticizes JEPD

The Old Testament: A historical, theological, and critical introduction

Richard S. Hess

Baker Publishing, 2016

Lita Cosner

Richard S. Hess's *The Old Testament: A Historical, Theological, and Critical Introduction* will doubtless become a standard textbook used in Bible colleges and seminaries. It does many things well, and there are some encouraging aspects to the textbook, although there will be areas of disagreement as well.

The goal of a survey such as this volume is to provide a general background to each book in question and to introduce major interpretive issues and give a general bibliography which can serve as a basis for more in-depth study. This book fulfills these functions well and takes an appropriately neutral tone throughout. So there will likely be a lot of appeal to use this book in evangelical schools, as it will be acceptable to a wide range of evangelical opinions.

Helpful format

The book is divided into four parts: discussing the Pentateuch, historical books, poetic books, and prophetic books, and within those parts each Old Testament book. Each chapter contains an overview of the book, a discussion of premodern readings and source criticism of the book, tradition history, literary readings, gender and ideology criticism, ANE context of the book, canonical context,

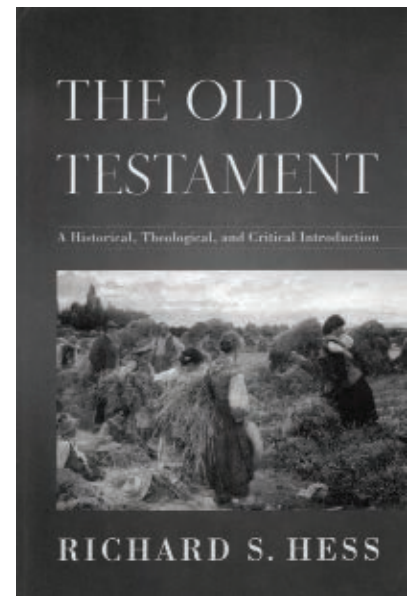
and theological perspectives. At the end of each chapter is a list of key commentaries and studies, though the student who wishes to find good sources will also want to consult the numerous footnotes.

Overall, the format is helpful, though a few of the longer books such as Psalms and Isaiah suffer from length restraints.

Critical of JEPD

It is critical for students of the Old Testament to be aware of source criticism—both what it posits about the composition of the Old Testament text and current scholarly skepticism about some of the older literary theories. Hess does a good job of covering this ground, noting, for instance, how more recent discoveries have supported an older composition date for the Torah:

“For example, the much earlier (fifteenth–twelfth centuries BC) Hittite suzerain-vassal treaties give evidence of a remarkable similarity to the outline of Deuteronomy 1–28. There is also the manner in which the recently published text from thirteenth-century-BC Emar have demonstrated the antiquity of practices (priestly anointing) and of literary forms (detailed multimonth ritual calendars) traditionally assigned to postexilic P authors. Add to this the archaic name forms, grammatical spellings and morphology, and aspects of the cultural world of Genesis that fit best in the second millennium BC (or sometimes the early second millennium), and one has some strong arguments to regard this material as something more than an invention of the Israelite monarchy



and postexilic world of the first millennium BC.” (p. 34).

Hess also notes the existence of ancient Near East creation myths that are often paralleled with the biblical account, but notes that there are significant differences between these myths, including *Enuma Elish* and the *Atrahasis Epic*, and the biblical account. He asserts that “there never was a close relationship between the creation stories of Genesis 1–2 and any ancient Near Eastern accounts” (p. 42).

Restrained on creation

Hess avoids any position at all on creation vs evolution; it is nearly impossible to discern his view as he apparently aspires to neutrality which is quite proper in an introduction such as this. His summary of Genesis sticks closely to the text, which is refreshing. This means that a wide variety of evangelical students will be able to use this introduction, though biblical creationists will take issue, for instance, with the implication that there was “brokenness and suffering” (p. 51) built into the pre-Fall creation.

Hess notes about the Torah:

“These texts remain the key starting point for the whole of the



Figure 1. Hess suggests that behemoth might be an hippopotamus, but the description fits a sauropod dinosaur much better.

Bible. They provide the essential understanding of the biblical view of creation, sin, the belief in a single loving and holy God, and the need of God's people for redemption and a life of love and holiness so that they may enjoy the blessings of a covenant relationship with God" (p. 24).

Solid introduction to Genesis

Hess's outline of Genesis does not differ much from most biblical creationist outlines, and he also notes the *toledot* structure. He does call Genesis 2 "the second story of creation" (p. 26), which is a characterization most biblical creationists would take issue with. However, he usefully compares Genesis 1–2 with genealogical doublets which occur later in Genesis (p. 37).

Also, oddly, he makes the statement, "Nevertheless, Noah's drunkenness leads to immorality and the loss of the pristine world after the flood" (p. 27), as if the point of the Flood was to make the world pristine again. Aside from a few such statements, there is very little that is objectionable in his characterization of the first 11 chapters of Genesis.

Regarding premodern readings of Genesis, Hess acknowledges:

"From the beginning, the church and synagogue interpreted the text of creation literally, but they also tended to find in the text metaphorical and other symbolic meanings in support of their own philosophical understanding of the beginning of the world" (p. 31).

Evidence for the historicity of the Exodus

Hess's introduction to Exodus is consistent with a high view of the text. He defends the historicity of the Exodus partially by appealing to the unlikelihood of a nation inventing a humiliating time of enslavement:

"If there had been no oppression and exodus, why would any Israelite authors invent such a humiliating origin for their people? If the Israelites were indigenous to Canaan and never came from Egypt, how did this story come to form the beginning of the nation's founding epic?" (p. 70).

Hess weighs the pros and cons of the early or late Exodus dates and the evidence supporting either one.

Other creation links

Hess helpfully recognizes links to the Genesis creation account in other places in the Old Testament. In his section on the Ten Commandments, he notes:

"In Exodus 20:11 the basis for the Sabbath is tied to the creation of the world in six days, followed by God's rest on the seventh. Thus the Sabbath observance becomes a reflection of the created order" (p. 146).

He notes the Edenic imagery present in the temple (p. 310). The genealogies in 1 Chronicles began with Adam, linking the historical origin of the Hebrew people with the first man created by God (p. 321). He notes that wisdom was with God at creation (p. 464).

Unfortunately, Hess follows the common line of equating Job's behemoth (figure 1) and leviathan with a hippopotamus and crocodile, respectively (p. 416). However, he does recognize that God's authority as Creator is central to God's challenge to Job (p. 406). "For Job, the Creator's power is so far beyond what mortal minds can understand that to challenge him or to seek to understand his ways is not possible" (p. 416). He also notes:

"Job 38–39 presents another account of God as Creator. This account follows a set of topics similar to Genesis 1; Psalm 89:10–13; and Psalm 104, texts in which God creates and controls the sea (and overpowers the sea monsters), fixes the earth on its foundations, brings forth springs of waters, creates day and night, creates the sun and seasons, and creates people" (p. 415).

Readers may take issue with Hess's assertion that Ecclesiastes teaches, "There is no real meaning behind creation, and one's effort and work contribute little or nothing because everything continues as it was" (p. 477). However, he does note the more positive interpretations others have put forward; for instance:

“A person has an interest and ability to know how all the created universe fits together but cannot know this through human efforts. Instead, it is necessary to know God the Creator, who made humanity in the divine image (Gen. 1:26–28). Only then does a person have the capacity to understand oneself, and what is the true value of things, beginning with life itself” (p. 483).

Chronology

Chronology is a concern for those studying the Old Testament. In particular, some judges overlapped with each other, and it is necessary to assume some co-regencies of the kings to make sense of the Bible’s statements about how Judah’s and Israel’s kings related to each other. His chronology here is generally in line with evangelical views, though there is always room to debate the finer details. He proposes a thirteenth, not fifteenth, century BC date for the Exodus, so many will take issue with that (p. 70).

A solid Old Testament introduction

Overall, *The Old Testament: A historical, theological, and critical introduction* does well what it aims to do. Students or interested laypeople will find an overview of each Old Testament book along with the most important related archaeological finds, the most pressing interpretive questions, and conservative enough for most evangelicals. While no one will agree with everything Hess advocates, it does serve as a useful introduction to the Old Testament. And while creationists may take issue with some of his statements, it is refreshing to see a mainstream work that is not overtly hostile to creation.

Supernaturalism is innate to natural moral law

God is Watching You: How the fear of God makes us human

Dominic Johnson

Oxford University Press, New York, 2016

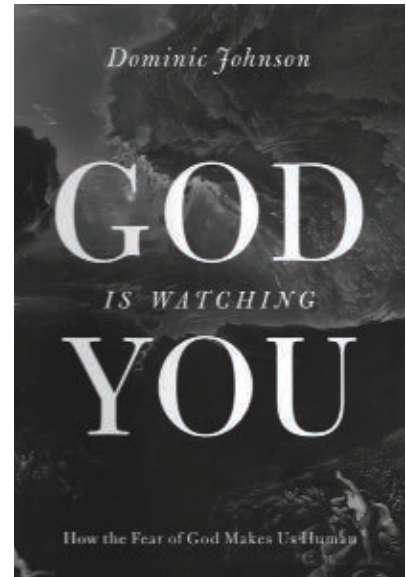
John Woodmorappe

This book is unusual in some respects. It combines evolutionary biology, psychology, anthropology, and other disciplines. The author, Dominic Johnson, has advanced degrees in evolutionary biology and in political science. The author parts ways with the likes of militant atheist Richard Dawkins, who has portrayed religion as something maladaptive. Instead, Johnson tries to explain supernaturalism, religion, morality, etc., in terms of human evolution. He says little about theology, but much of what he writes, when divested of its evolutionistic baggage, has much relevance to the biblical worldview. For this reason, I go beyond the immediate contents of this book in order to elaborate on these implications.

Supernaturalism is deep-seated and primordial

Author Johnson rejects the common humanist supposition that supernaturalism in general, and religion in particular, are mere products of culture, moreover borne of pre-scientific ignorance, and are fated to disappear with human advancement. He concludes:

“Clearly, human beings have a natural tendency to perceive supernatural agency, of which religion is only one example. Human brains are wired to believe that events happen



for a reason, and that our actions have consequences. This feeling is pervasive and powerful, churning away even when we are alone and even among atheists trained in statistics and skeptical of coincidences. All of us—believers, agnostics, and atheists alike—worry about unseen eyes observing and judging our actions, even our motives and thoughts. Humans are guided by an inner sense of duty to some kind of Big Brother. It’s not just a religious belief. It’s bigger than that. It’s human nature” (p. 136).

The alleged evolution of belief in the supernatural

The author, first of all, thinks that belief in supernatural beings arose as an extension of the mind-body dualism: Just as humans think of their minds as entities that exist independent of their brains, so also they imagine that sentient beings can exist even though they have no bodies.

In arguing this way, Johnson is, of course, afflicted with a materialistic bias—a bias that posits that our self is nothing but the firing of neurons in our brains, and that the only real entities are corporeal ones.

Johnson also supposes that human belief in supernatural causes derives from an exaggerated human sense of agency. As an example of this, he cites experiments where humans observe moving objects on a screen. The observers incorrectly conclude that one object is chasing or evading another even though the objects are actually moving randomly relative to each other.

The author suggests that the exaggerated sense of agency was of Darwinian survival advantage, based on the following line of reasoning: It is usually much costlier to disregard a valid connection (e.g. between a sound and an incoming predator) than it is to believe an invalid connection (e.g. between a sound and a non-existent predator). Johnson makes the analogy with the smoke detector that is intentionally made a little oversensitive: It is much better to put up with the occasional nuisance of a smoke detector going off from a bit of smoke during cooking than it is to face the potentially disastrous situation of the smoke detector failing to go off, in a timely manner, during a real fire.

The foregoing scenario makes perfect sense as an explanation for entire herds of animals going into immediate panicked flight (stampede) at the mere sound of a broken twig. It is much more difficult, however, to straightforwardly connect more complex forms of exaggerated human agency with Darwinian survival advantage.

Perhaps the exaggerated and misplaced sense of agency, among humans, is actually the product of the human alienation from God that had resulted from the Fall. The human no longer has direct knowledge of God's doings and God's plan for events. This

also can account for the prevalence of magic and shamanism, the occult, and superstition—all of which stem from an overdeveloped sense of agency. As a result of his lost closeness to God, the human is now clutching to poor-substitute forms of guidance about the future and control of the future. A rather egregious example of this was Saul, who, having abandoned his fellowship with God, consulted a spirit medium to try to determine the future (1 Samuel 28).

Core elements (including creationism and the universal deluge) in all religions

Johnson describes several studies that looked for universals among all religions. For instance, the author comments:

“Oxford anthropologist Harvey Whitehouse has identified twelve characteristics that tend to be found among all religions, irrespective of period, continent, or culture. Included in this list are ‘beings with special powers’, ‘moral obligation’, an ‘afterlife’, and—not least—supernatural ‘punishment and reward’, all of which point to the universal importance of people’s concern for all the supernatural consequences of their actions” (p. 58).

More on this later. “The rest of Whitehouse’s twelve characteristics were: ritual exegesis, the sacred, signs and portents, deference, creationism, spirit possession, rituals, and revelation” (p. 251).

Scientific creationists have long been calling attention to the ubiquity of ancient accounts of a global Flood. Johnson concurs:

“Some commonalities do remain surprising in their specificity. For example, the legend of a great flood is widespread in indigenous cultures . . . Even the details are similar . . . As in the Biblical version, these floods were retribution for man’s misdeeds . . .” (p. 256).

Children are born theists, not born atheists

Modern atheists have essentially redefined atheism as an absence of belief in God, and not a conscious rejection of God. They have also argued that, in accordance with this definition, children are born atheists, and only come to believe in God when they are indoctrinated to do so.

The exact opposite is the case! It is atheism that must be inculcated, and not belief in God. Johnson makes this perfectly clear:

“The main finding is that children tend to hold beliefs in supernatural causes of events, the afterlife, supernatural agents, and a Just World, from a very young age. As soon as the relevant cognitive machinery is in place (such as a theory of mind), children exhibit beliefs in supernatural concepts (such as that there are supernatural agents who know what they know) . . . It seems that children also have an innate tendency to believe that supernatural agents are especially concerned with right and wrong (again, something that has been explicitly explored and found in experiments). Hence Joseph Bulbalia’s argument that ‘children are not only intuitive theists, they appear to be intuitive moralists’” (pp. 131–132).

As for the other side of the coin, Johnson quips:

“Atheism must be enculturated, and this may not be easy . . . Sociologist William Bainbridge suggests that atheism has other important causes, such as being raised by atheists, early traumatic experiences with religion, having ‘resolutely unmystical personalities’, a rebellious adolescence, or socialization to antireligious ideologies in one’s profession” (p. 132).

Fear of supernatural displeasure is innate to humans

While religions, of course, differ from each other in details, the element

of supernatural surveillance and punishment is common to most of them. Johnson comments:

“Discussions about supernatural reward and punishment often revolve around God, but of course there are many alternative agents wielding supernatural power. They may take the form of a single monotheistic God, a pantheon of different gods, angels, demons, ancestors, ghosts, spirits of nature, animal spirits, witches, sorcerers, jinns, and so on” (p. 86).

Johnson adds:

“As we have seen, ethnographic and cross-cultural studies suggest that beliefs in supernatural punishment are widespread, powerful, and deeply rooted, and this goes for indigenous, ancient, and modern societies alike. Exceptions do not reverse a broader trend While capricious gods crop up they are far less pervasive than the numerous supernatural agents that reward and punish for some systematic *reason* [emphasis in original]” (pp. 92–93).

The alleged evolution of the dread of supernatural displeasure

Johnson contends that the fear of being monitored, by supernatural agents, evolved to enable human societies to function. This fear of supernatural punishment drove humans to curb their naturally selfish instincts, and, as elaborated below, did so with levels of effectiveness that natural consequences of misconduct never could.

The author supports his reasoning as follows:

“My own empirical work comparing 186 preindustrial cultures around the world also found support for a link between beliefs about supernatural agents and cooperation. The overall result was that irrespective of the *type* of religion or *region* of the

globe, moralizing gods were more frequent among societies that were larger, centrally sanctioned, policed, use and loan money, and pay taxes [emphasis in original]” (p. 183).

Perhaps another explanation is in order. One must remember that, after the Noachian Deluge and the confusion of tongues at the Tower of Babel, nations turned away from God. It is possible that the larger societies, by virtue of their size and sophistication, retained a larger vestige of pre-Abrahamic monotheism, and that is why they were more likely to still believe in moralizing gods. In contrast, smaller societies, owing to their modest size, were more likely to drift into total barbarization and total forgetting of the One True God.

Implications of the fear of supernatural displeasure

The author does not argue that belief in God, or other punitive supernatural agencies, is absolutely necessary in order for morality and social order to function. Rather, he sees them as potent ingredients in the enforcement of the same. He thus summarizes his ideas:

“This book has argued that supernatural punishment is a key driver, playing a powerful role in achieving and sustaining cooperation—and it does so among modern, ancient, and indigenous societies, as well as holding up to scrutiny in controlled laboratory experiments. Supernatural punishment is not only widespread, it is also a significantly more potent weapon than we might have thought, because human beings and human brains are particularly susceptible to *negative* events, and because *supernatural* punishment is inherently more powerful than secular punishment [emphasis in original]” (p. 238).

The power of the fear of supernatural retribution, in regulating human

conduct, owes to the fact that, unlike the human punisher, the supernatural punisher never slackens, cannot be deceived by the offender, and—most important of all—sees every single thing that a person thinks and does. No human leader—no matter how clever and powerful—can do that! Moreover, the offender has to face the possibility that the supernatural punisher will administer the punishment in his own supernatural way and time, and administer forms of punishment that no mere mortal ever could. The classic example of this in the Christian faith, brought up by Johnson, is Matthew 10:28, wherein the Lord told His disciples not to fear the human, who can only destroy the body, but to fear God, who can destroy both the body and soul in hell.

The reader can remember how Adam and Eve simultaneously tried to hide from God and to cover up their guilt with fig leaves (Genesis 3:7–10). Let us apply this as a corrective to Johnson’s reasoning. Instead of an evolutionary development, the universal human fear of supernatural retribution can best be understood as a displaced sense of unresolved guilt, before God, that owes to the Fall and its consequences. An extreme example of such displaced and unresolved guilt can include the pagan who engages in child sacrifice in order to appease the gods.

Only the Gospel can undo the effects of the Fall. In addition, only the Gospel can adequately resolve human guilt for sin.

Neo-Marxism debunked: religion is not an invention of the powerful

Karl Marx taught that religion is the opium of the people. The down-trodden would contentedly remain in their miserable state because they were inculcated in belief in the ‘pie in the sky’. A modern version of this

notion is that religion is a tool of the elite in enforcing the subordination of the masses.

Johnson, in contrast, points out that everyone, regardless of social class, is affected by religion, and benefits from religion. He writes:

“If large-scale social order is to be achieved, then someone has to lead, and others have to follow. . . . Indeed, for society to succeed at all, followers may have enjoyed a net benefit of being in a group, even if (a few) leaders gained more” (p. 197).

“To summarize, supernatural punishment is not a ruse of the elite. It is a deterrent that works precisely because it places authority and ultimate power way beyond what any mere mortal is capable of—whether peasant, priest, or potentate” (p. 198).

Thus it is no accident that some of the best social revolutions for good appealed to a power higher than the human rules, e.g. Wilberforce and the abolition of slavery, and Rev. Martin Luther King Jr.’s *Letter from a Birmingham Jail*:

“[T]here are two types of laws: just and unjust. I would be the first to advocate obeying just laws. One has not only a legal but a moral responsibility to obey just laws. Conversely, one has a moral responsibility to disobey unjust laws. I would agree with St. Augustine that ‘an unjust law is no law at all’.

“Now, what is the difference between the two? How does one determine whether a law is just or unjust? A just law is a man made code that squares with the moral law or the law of God. An unjust law is a code that is out of harmony with the moral law.”

Natural moral law is tacitly validated

This book upends many popular liberal notions. It turns out that morality is not simply an arbitrary human

convention, and today’s climate of wishy-washy moral relativism is not in accordance with the facts. Although Johnson does not put it in these terms, he makes this clear.

The concept of natural moral law has a long history (figure 1). Thanks to this book, it now finds a fascinating scientific corroboration.

The author quotes David Welch, a political scientist:

“Comparative ethicists have shown that there are no premoral societies;

that all societies give some degree of moral value to such things as human life, sexual restraint, friendship, mutual aid, fairness, truthfulness, and generosity; and that all societies employ moral concepts such as good, bad, right, wrong, just, and unjust” (p. 95).

This fits perfectly with the teachings of the Apostle Paul (Romans 2: 14–15). Humans have a built-in sense of right and wrong, even when this sense is muted and distorted by the self-darkening of human sin and the debaucheries of pagan religions. This also helps answer the question of how God can send people to hell that have never heard the Christian message. Every human being has some sense of God (Romans 1:20–21) and has some concept of God’s law (Romans 2:14–15), even if he or she has never once been taught anything about God or the Ten Commandments.

Conclusion

Christians have long supposed that belief in the supernatural, and concepts of right and wrong (natural moral law), are not merely the products of cultural conditioning, but are innate to human beings. This is now supported by anthropological and other forms of scientific evidence. The existence of the supernatural, concepts of morality, and supernatural monitoring and punishment of human conduct, are all ‘hard-wired’ into the human brain.

Instead of having originated through evolution, as proposed in this book, all this can be recognized as the direct creative act of God. After all God had created humans in His image and likeness (Genesis 1:26), so it is hardly surprising that God has put these instincts into all human beings.

**LAW IS TWOFOLD —
NATURAL AND
WRITTEN. THE
NATURAL LAW IS IN
THE HEART, THE
WRITTEN LAW ON
TABLES. ALL MEN
ARE UNDER THE
NATURAL LAW.**



SAINT AMBROSE

Figure 1. Both Christian and non-Christian thinkers have recognized the fact of natural moral law, and it now has a scientific basis.

Reading evolution into the Scriptures

Adam and the Genome: Reading scripture after genetic science

Dennis R. Venema and Scot McKnight

Brazos Press, Grand Rapids, MI, 2017

Robert W. Carter

I have known for some time that I needed to address some of the scientific claims being generated by the self-styled ‘evolutionary creationists’,¹ but I also wrongly believed that the challenge they were issuing was going to be a strong one. This particular book was divided into two sections—one on the genetics and one on the theology of the subject. This breadth of subject matter makes it difficult for a single person to review. In the end, I was disappointed, for the challenge made by these two authors was weak.

Venema is Professor of Biology at Trinity Western University in Langley, British Columbia, specializing in fruit fly genetics. McKnight is currently Professor of New Testament at Northern Baptist Theological Seminary in Lombard, Illinois.

The setup

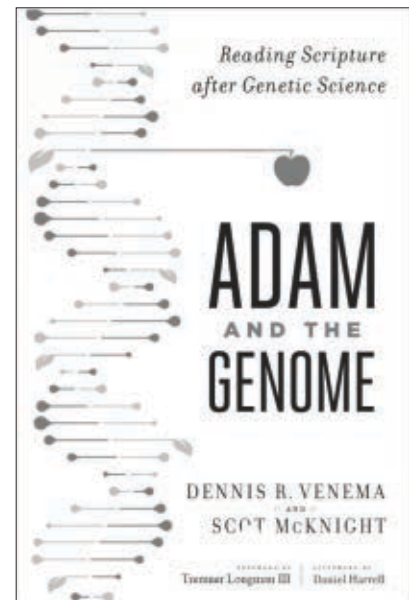
Tremper Longman, in the foreword, tells us that forcing young people to choose between evolution and creation “has worked great harm” and those who choose creation “often do so at the cost of their intellect”. Invective like this is as unhelpful as it is incorrect. Yet it sets the tone for the entire book and shows what type of argumentation we are dealing with.

Venema then begins the book with a false dichotomy. He describes how he grew up surrounded by people who distrusted science, thought evolution was “evil”, and who were apparently disinterested in scholarly pursuits. Thus, he frames his conversion from creationist to evolutionist as a matter of intellectual development.

The holes in this story are manifest. First, most people, including many who believe in evolution, are intellectually lazy. Second, organizations like CMI are on record as encouraging people to not make such arguments.² And third, this is the absolute opposite of my own experience. He makes an appeal to the church to adopt evolution so as not to lose the young, going so far as to say this is “for the future of the Kingdom” (introduction, p. x)! Yet, the denomination I grew up in has been hemorrhaging members for decades, as is the case for so many others that compromise on the evolution question.

Early on, Venema makes another poor argument when he tries to explain what he means by ‘evolution’ by comparing the random changes that occur in DNA to how languages change. But language development cannot be separated from the mind or from conscious choice, e.g. the widespread borrowing of words and phrases. In fact, had he done any homework at all, he would have known that biblical creationists had a ready answer to his false comparison.³

Though Venema understands that science flourished in Christian Europe,⁴ he fails to note the switch to philosophical naturalism as an underpinning philosophy during the Enlightenment. Prior to that, the Christian philosophy that launched



modern science as we know it was rooted in more of a methodological trust that God was upholding the universe in a constant manner.

I discovered a key to deciphering the arguments of both authors: every time they say ‘science’, one can replace that word with ‘philosophical naturalism’ to see that it is not science (as an exploration of what we can directly test) to which they are referring. Unsurprisingly, we are also treated to a discussion of the ‘two books’ fallacy⁵ that has been used so often to introduce philosophical naturalism into biblical studies.

Revealing their hand

The attitude displayed by the two authors is sadly typical of those living within the university bubble. In this case, they do not directly mock their opponents, but they also do not fairly represent them. Thus, they lay yet another trap for the incautious reader.

For example, Venema resorts to the genetic fallacy when he says that any biologist who rejects evolution does so “because of prior religious commitments” (p. 40; so is evolution never accepted because of prior

materialistic commitment?). He argues as if there are no scientific reasons to do so,⁶ and that the Adam and Eve hypothesis “has not found any experimental support” and therefore is not something “geneticists view as viable” (p. 55). But claiming there is no experimental support for something is not in itself good scientific reasoning. For example, even though the support is very small, this does not mean there is *zero* evidence for things like geocentrism⁷ or even a flat earth.⁸

And since *some* geneticists (e.g. Sanford,⁹ Jeanson,¹⁰ Tomkins,¹¹ myself,¹² and many others) view biblical history as viable, his statement is also demonstrably false. Falling afoul of the ‘no true Scotsman’ fallacy, he claims that evolution is “not controversial to scientists” (p. 65). Read that again, but replace the word ‘scientists’ with ‘philosophical naturalists’ and you will see his use of a bait-and-switch. McKnight goes so far as to say the “so-called scientific creationists” operate out of “fear” (p. 101), as if we couldn’t possibly have any scientific objections to his ideas (although he has no qualifications in science). He also insists that “an honest and wise reader” will agree with his view that there are two creation accounts in Genesis (p. 102). Here, even though he is hardly an Old Testament scholar, he is tacitly calling his opponents liars.

A quick look at the chapter references reveals that Venema is not well read on the subject he is addressing. For example, he cites very few biblical creationists, has apparently never read my article “Can mutations produce new information?”¹³ and is not familiar with the Waiting Time Problem.¹⁴ He then claims that “there does not appear to be anyone in the antievolutionary camp at present with the necessary training to properly understand the evidence” (p. 65) and that “no one in the creationist camp writing about these data seems to

understand the evidence, much less has the ability to credibly undermine it” (p. 205, reference 38). These are tremendously sweeping statements in which he refuses to acknowledge the credentials of his opponents. This displays either a lack of scholarship or deceit. I will let the reader decide.

The science

Venema asks why there are no invertebrate tetrapods. His answer is that four-legged animals did not evolve until after animals with backbones evolved and that this progression is reflected in the fossil record. I ask in return: “Why are there no vertebrate hexapods?” or, “If tetrapody is so great, why did it only occur once?” There is nothing preventing *evo devo*^{15,16} from doing things like this, except for the fact that radical changes to an individual’s body plan are proscribed by the survivability and reproduction criteria of life. Thus, he is asking a question that neither theory can answer while at the same time ignoring some glaring problems with his own.

Does the fossil record clearly demonstrate evolution, as he adamantly claims? Evolution requires lots of experimentation. The greatest evolutionary innovations, then, would require the greatest number of ‘transitions’. Yet, in the fossil record, the greatest leaps in evolutionary technology are spanned by the fewest transitional species (for example, the so-called Cambrian Explosion, with sudden origins of whole phyla, including Chordata,¹⁷ but other examples abound).

Venema talks about the “fishapod” *Tiktaalik* (without mentioning it by name), hailing it as a transition to four-footed creatures,¹⁸ but he fails to mention that tetrapod footprints have been discovered in Poland that predate the supposed evolution of tetrapods from a *Tiktaalik*-like ancestor by

millions of years.¹⁹ In other words, not only is *Tiktaalik* not transitional, but there is currently no candidate species for the supposed transition. Tetrapods simply ‘appear’ in the fossil record. Indeed, footprints in general are a problem, as paleontologist Dr Marcus Ross explains:

“This is a pattern we see in several different groups, where their footprints are first, and their body parts are later. For the trilobites, for the amphibians, for the dinosaurs—the first time I find evidence of them in the fossil record, it’s from trackways, not from hard parts. From an old-earth perspective, that’s really weird, and hard to grapple with, because you have millions of years of trackway production, then ultimately the animal that made it. But that obviously doesn’t make a whole lot of sense. Because if there’s trackways, there’s animals, and those animals have bones and teeth and shells to them, why aren’t they fossilized? Instead the pattern is telling us something different: there’s no time between when somebody leaves a track and when somebody’s buried.”²⁰

And what are we to do with the recent discovery of a fully fledged mammal “deep” in Jurassic rocks?²¹ The discoverer claimed that mammals originated “at least in the late Triassic”. This pushes the supposed origin of mammals to well before the supposed origin of most dinosaurs. Range extensions like this example have been going on for the past two centuries and should make one seriously question today’s evolutionary stories.

Venema discusses whale evolution at some length. This is important to me because seeing depictions of *Pakicetus* in *National Geographic* was one of the main reasons I accepted evolution in my early years. Finding out that the image was nothing more than ‘artistic license’²² started me on a long journey into biblical creation. His comment

to the effect that science seems like it is “constantly contradicting itself” because it is being reported by “gullible and uninformed journalists” (p. 7) fails to account for the fact that bad science is being reported at the top-most levels of the evolutionary establishment. Sadly, this has been the case from the beginning.²³ This is a major lapse on his part.

I find it interesting that Venema does not make much use of the ‘junk DNA’ argument. Maybe, like Francis Collins,²⁴ he has come to understand that it was a bad argument²⁵ from the beginning.²⁶ Yet, Venema does hint at it, strongly. He lists, for example, multiple mutations in olfactory receptor genes that form a nested hierarchy among the great apes and humans (p. 34). But would he be surprised that these belong to one of the most mutated of all gene types among living humans?²⁷ I do not have a ready answer for why this gene family would fall into a nested hierarchy, but, from experience, I am deeply suspicious of the evolutionary claims.

Concerning human history, there are multiple ways to estimate ancestral population sizes, and he deals with several. But each time he gets into the details he makes assumptions that are overly broad and in many cases might simply be wrong. For example, he spends several pages talking about how genes are shuffled over time. When you have a large population, you will see many different gene combinations, because lots of people means lots of shuffling per generation. Conversely, when you have a historically small population, you will see many fewer gene combinations.

That is all well and good, but to draw the conclusions he does, he assumes that several significant confounding factors do not vary across time or geography. The patterns are affected by the rate of recombination (and it appears that Africans have more recombination events

per generation),²⁸ the potential of ‘population substructure’ (well attested to in African populations),^{29,30} differential generation times (and different cultures would be expected to show differences here), non-equivalent rates of gene conversion (and some now think this varies among individuals, among the sexes, etc.),³¹ as well as differences in historic population sizes among the various world populations. An additional known problem is that multiple models can explain the same genetic data, and later events are expected to mask earlier ones in many cases.³² In the end, yes, some of the data can be explained by evolutionary models, but this does not mean alternate models are necessarily excluded. Unless, that is, one applies circular reasoning.

One strong argument he makes is that, in the case of the insulin gene, humans and chimpanzees are more similar than humans and gorillas. In essence, he is asking: “If these species do not form a nested hierarchy of ancestry, why would God make it appear that they did?” Note that atheistic evolutionists are, in practice, hardly distinguishable from theistic ones, and they also use such arguments—even though the arguments are pseudo-theological, not

scientific.^{33,34} Also, yes, the pattern does comport to evolutionary history, but no, there is nothing in the biblical model that says the pattern should *not* be like this. This is an old tactic on their part, raising evidence that makes sense under evolution but ignoring that it also makes sense under creation. Shall we call this ‘the fallacy of overlapping predictions’?³⁵

Tellingly, he avoids any discussion of orphan genes.³⁶ These unique genes lack any form of nested hierarchy and appear in all branches of life, including the more than 650 genes unique to humans and absent in the great apes.³⁷ The presence of orphan genes cannot be explained by incomplete lineage sorting.³⁶ Neither can they be explained by evolutionary mathematics of large populations across several million years.

Another telltale example that shows how he is playing fast and loose with his interpretations is his Figure 3.6 (reproduced here as figure 1). This purports to show a nested hierarchy of descent of humans, chimps, and everything in between from a common ancestor. This is nothing more than a cladogram.³⁸ That is, a nested-box structure. Any group of things derived from an intelligent source can be categorized by levels of similarity.

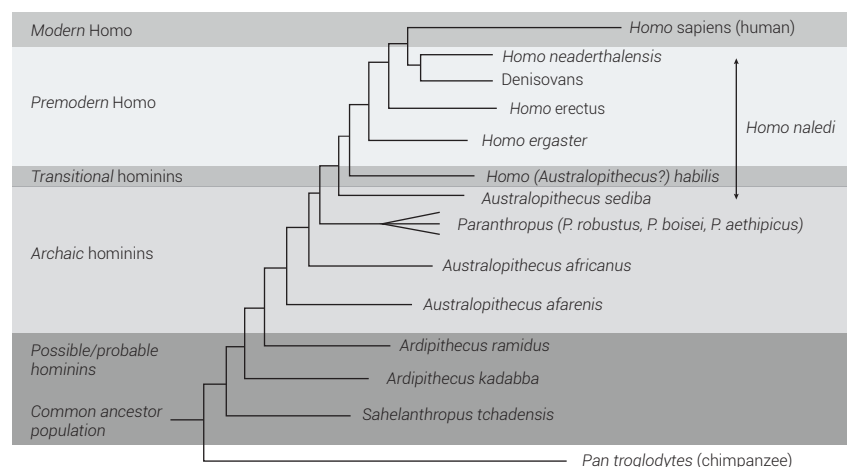


Figure 1. Figure 3.6 from *Adam and the Genome* is nothing more than a cladogram that purports to show a nested hierarchy of descent of humans, chimps, and everything in between from a common ancestor.

Thus, diagrams like this are absolutely expected on both sides, and so cannot be used as evidence of one side against the other. Not only is the link between the genus *Homo* and the australopiths weak in general,³⁹ but I wryly note that *Homo habilis* (Louis Leakey's⁴⁰ pet theory that some have referred to as "the little man that never was"⁴¹) is labelled as "*Homo (Australopithecus?) habilis*". The key link between humans and apes is questionable? Indeed so, as many evolutionary anthropologists regard it as a 'wastebasket taxon'.⁴²

He starts off his discussion on Intelligent Design with a quote from Darwin, who said: "Any one [*sic*] whose disposition leads him to attach more weight to unexplained difficulties than to the explanation of a certain number of facts will certainly reject my theory"⁴³ (p. 67). Nonsense like this is easily countered with a quote reputed to be from Einstein: "No amount of experimentation can ever prove me right; a single experiment can prove me wrong."⁴⁴ This does not mean that a single contrary experimental result *will* disprove a theory, for an ancillary hypothesis could be disproved while leaving the core theory intact,⁴⁵ but in principle all it would take is one ground-shaking new discovery to dislodge Darwin.

It is no wonder that Venema avoids a discussion of carbon-14 in diamonds,^{46,47} the presence of soft tissue, DNA, and carbon-14 in dinosaur bones,^{48,49} and the detailed experimental results from the evolutionary modelling program *Mendel's Accountant*.⁵⁰ All of these argue strongly that deep-time evolutionary theory is deeply flawed and qualify for the 'single experiment' of Einstein.

Mathematics

He, of course, quotes the 95% human-chimp genome-wide similarity claim, ignoring the work of creationists who claim the similarity is much less,⁵¹ as well as the hugely

different Y-chromosomes.^{52,53} However, even if this high number were true, we still have a problem with evolutionary mathematics. A 5% difference represents many millions of mutational differences, each of which has to arise independently in a single individual in one of the respective populations and then *drift* to the point of fixation. But there have only been a few hundred thousand generations in all of evolutionary human and chimp history. During these relatively few generations, millions of mutations would be simultaneously clamouring for attention, which is a problem that natural selection cannot overcome.⁵⁴ The problem has been codified as Haldane's Dilemma,⁵⁵ and now has rigorous mathematical and computer modelling behind it. But *Mendel's Accountant* has been used to show that Haldane's Dilemma is much worse than evolutionists have dared to imagine.⁵⁶

When he turns to a discussion of Michael Behe's main thesis in *The Edge of Evolution*,⁵⁷ he summarily dismisses it (p. 73). When Venema does get around to actually addressing the claims, it is nothing more than *ad hominem*, but it's mainly abusive *ad hominem*.⁵⁸ Behe claimed that changes in complex organisms that require more than a few random mutations cannot happen in evolutionary time (this has now been thoroughly tested by Nelson and Sanford⁵⁹). Behe, Sanford, and others have laid down a strong mathematical challenge. His only response seems to be that 'these things appear to have evolved so they must have'(?). This avoidance of mathematics is par for the course.

He also claims that if a human were reduced to a single breeding pair it would leave "telltale marks" in the genome and create "a severe reduction in genetic variability" (p. 46–47). There are multiple issues with this. First, he is assuming a 'reduction' in population size instead of a starting point of two individuals with no

detrimental mutational load. Second, he ignores the possibility of 'created diversity'. This avoids his contention that "one would have to postulate mutation rates far in excess of what we observe for any animal" (p. 48). Yet, since the average individual carries about one third of all common alleles, if you took two random individuals from the *modern* population and put them into an Adam-and-Eve scenario, a huge fraction of worldwide allelic diversity would be retained. Third, in an exponentially growing population, there is almost no genetic drift. Thus, a one-generation population bottleneck would not leave the telltale marks he is expecting.^{60,61} Citing the current lack of variability among Tasmanian devils (p. 47) is a distraction, because the reason for the lack of variability was a *prolonged* bottleneck.

A theology of absence

Venema wraps up his section with a claim that science has revealed to us how God brought His creation into being (pp. 90–91). But where is God in any of this? From the big bang, to the origin of life, to the advent of modern man, God is absolutely and unequivocally irrelevant in the naturalistic mind. The second half of the book was written by Scot McKnight, who admits to being new to the scene (p. 96) and who leans heavily on people like John Walton⁶² and Peter Enns⁶³ for his theology. I do not want to take much time to review McKnight's material, for these ideas have been reviewed thoroughly already.

However, he starts out with a grand deceit. Many students of the Bible have been taught that "a text without a context is a pretext". He takes that idea and spins it to mean one must look at the Genesis text in the context of other Ancient Near Eastern (ANE) writings. In so doing, he has taken a sound method of textual exegesis and morphed it into something most Bible

teachers never intended. Worse, in all his discussion of how the Genesis text relates to those of other cultures, he demonstrates beyond any shadow of doubt that the Genesis account is unique among its peers. There is but one God in the Genesis account, who is not lonely or tired, or sexually charged, or trapped within the cosmos, or even anthropomorphic. He is not powerless to stop evil, nor is He involved in ‘theomachy’ (a heavenly war among the gods). This completely undercuts his arguments, and why he can’t see that is a mystery.

In one chapter, he lays out 12 theses, only some of which are true, although some are interesting (like the idea of Earth being created as a temple for God). He also spends considerable time discussing the differences between the literary, historical, biological, and genealogical Adam and Eve. I found this unsatisfactory, because these ideas are merged by the later biblical writers (e.g. Luke traces Jesus’ lineage to the genealogical ancestor Adam, who must then be the historical, and biological, ancestor, who we can only learn about in the literary text of Genesis). In another chapter, he talks about the ‘variety’ of Adams and Eves in the Jewish world. But Jesus had little patience for the philosophers and theologians of his time. He must be allowed to correct their misunderstandings. Thus, when he makes statements to the Pharisees like “Have you not read” in Matthew 19:4–8, while using Adam and Eve for a discussion on marriage, He is making an explicit appeal to the historicity of the text.

McKnight says that “Paul’s Adam is unlike anything we’ve seen in the Jewish traditions” (p. 181). But does not Paul have the authority to correct the situation?⁶⁴ Or is Paul just a theologian, perhaps on the level of McKnight? He says he is “not assuming ... Paul somehow got it wrong” (p. 176). But even if he does not think Paul made a biblical error,

he thinks the Bible itself is in error! Also, Paul displayed a mastery of various Greek philosophical schools, eviscerating them at the Areopagus (Acts 17:22–23) and quoting from them at various points in his letters. If Paul was not inspired to correct the views of his day, what is the Bible? In fact, the many examples of people struggling with the historicity of Adam in New Testament times could be seen as people wrestling with the plain meaning of the words in Genesis and trying to accommodate them to the ideas and ideals of the day. We could say the same for the authors of this book.

McKnight spends a lot of time discussing Romans 5:12,⁶⁵ saying that Bible expositors have got it wrong since the time of Augustine. But the idea that death entered the world through Adam’s sin is not just rooted in Romans 5:12. In fact, Romans 8:19–22 states that the entire universe is suffering under the weight of Adam’s sin,⁶⁶ which makes no sense if McKnight is right that sin is in the world because “*each person sins in the way Adam sinned*” [emphasis in original] (p. 184). Adam was born *different*. He was born without sin and had a choice to make. We are born in a world already condemned to a certain and specific fate. Adam is our *federal* (covenantal, representative) head, which is why God saw us fall ‘in Adam’. Thus, when Jesus set Himself up as the *federal* head of the church, He was modelling Adam, and replacing Adam. Romans 5:12 is just one link in a chain of related ideas.

Naturalism starts by rejecting God’s words in Genesis. Should we then re-interpret the science of Genesis in light of modern naturalistic science? This is the definition of circularity and the formula can only produce one result: a rejection of the historicity of Genesis. But what follows is a rejection of much of the Christian tradition. It is clear that both authors do exactly that.⁶⁷

References

1. Woodmorappe, J., ‘Evolutionary creation’—evolution rules supreme, A review of *Evolutionary Creation: A Christian approach to evolution* by Denis O. Lamoureux, *J. Creation* 27(3):17–22, 2013; creation.com/lamoureux.
2. See for example creation.com/dontuse.
3. Steel, A.K., The development of languages is nothing like biological evolution, *J. Creation* 14(2):31–40, 2000; creation.com/language_development.
4. Williams, A., The biblical origins of science: A review of *For The Glory of God: How monotheism led to reformation, science, witch-hunts and the end of slavery* by Rodney Stark, *J. Creation* 18(2):49–52, 2004; creation.com/stark.
5. Kulikovskiy, A., Scripture and general revelation, *J. Creation* 19(2):23–28, 2005; creation.com/genrev.
6. See, for example, creation.com/evolutions-achilles-heels.
7. Carter, R. and Sarfati, J., Why the Universe does not revolve around the Earth: Refuting absolute geocentrism, creation.com/geocent, 12 Feb 2015.
8. Carter, R. and Sarfati, J., A flat earth, and other nonsense: Dealing with ideas that would not exist were it not for the Internet, creation.com/refuting-flat-earth, 13 Sep 2016.
9. creation.com/sanford.
10. answersingenesis.org/bios/nathaniel-jeanson.
11. icr.org/jeffrey_tomkins.
12. creation.com/carter.
13. Carter, R.W., Can mutation produce new information? *J. Creation* 25(2):92–98, 2011; creation.com/mutations-new-information.
14. Sanford, J., Brewer, W., Smith, F., and Baumgardner, J., The waiting time problem in a model hominin population, *Theoretical Biology and Medical Modelling* 12:18, 2015; tbimed.biomedcentral.com.
15. Williams, A., Evo Devo refutes neo-Darwinism, supports creation, *J. Creation* 19(3):40–44, 2005; creation.com/evo-devo2.
16. White, D., Climbing Mt Improbable ‘evo devo’ style, *Creation* 31(4):42–45, 2009; creation.com/evo-devo.
17. Woodmorappe, J., The Cambrian explosion in colorful, zoological context: A review of *The Cambrian Explosion: The construction of animal biodiversity* by Douglas H. Erwin and James W. Valentine, *J. Creation* 27(3):37–40, 2013; creation.com/cambrian.
18. See Woodmorappe, J., Tetrapods from Fish? A review of *Gaining Ground: The origin and evolution of tetrapods*, 2nd edn by Jennifer A. Clack, *J. Creation* 28(1):26–30, 2014; creation.com/tetrapods-from-fish.
19. Walker, T., Is the famous fish-fossil finished? *Tiktaalik*, the transitional star, faces an evolutionary dead-end, *Creation* 32(3):38–39, 2010; creation.com/tiktaalik-finished.
20. Ross, M., in *Is Genesis History?* Compass Cinema, 2017.
21. Switek, B., Chisel-Toothed Beasts Push Back Origin of Mammals, 10 Sep 2014; news.nationalgeographic.com.

22. Williams, A. and Sarfati, J., Not at all like a whale, *Creation* 24(4):20–22, 2005; creation.com/pakicetus.
23. Grigg, R., Abandoned transitional forms, *Creation* 33(2):12–15, 2011; creation.com/abandoned-transitional-forms.
24. Collins, F., *The Language of Life*, Free Press, New York, p. 5, 2011.
25. Klinghoffer, D., On junk DNA claim, Francis Collins walks it back, admitting ‘hubris’, evolutionnews.org, 19 July 2016.
26. Carter, R.W., The slow, painful death of junk DNA, *J. Creation* 23(3):12–13, 2009; creation.com/junk.
27. Conrad, D.F., A high-resolution survey of deletion polymorphism in the human genome, *Nature Genetics* 38(11):75–81, 2006.
28. Hinch, A.G. *et al.*, The landscape of recombination in African Americans, *Nature* 476:170–177, 2011.
29. Schiffles, S. and Durbin, R., Inferring human population size and separation history from multiple genome sequences, *Nature Genetics* 46(8):919–927, 2014.
30. Nielsen, R. *et al.*, Tracing the peopling of the world through genomics, *Nature* 541(14):302–309, 2017.
31. Halldórsson, B.V. *et al.*, The rate of meiotic gene conversion varies by sex and age, *Nature Genetics* 48(11):1377–1387, 2016.
32. Myers, S., Fefferman, C., and Patterson, N., Can one learn history from the allelic spectrum? *Theoretical Population Biology* 73:342–348, 2008.
33. Dilley, S., Nothing in biology makes sense except in light of theology? *Studies in History and Philosophy of Biological and Biomedical Sciences* 44:774–786, 2013.
34. Sarfati, J., Rats! A toothless argument for evolution, *Creation* 24(1):45, 2001; creation.com/rats.
35. I explained this deceit in an article, How to Think, not What to Think, creation.com/how-to-think, 1 Nov 2016.
36. Tomkins, J. and Bergman, J., Incomplete lineage sorting and other ‘rogue’ data fell the tree of life, *J. Creation* 27(3):84–92, 2013; creation.com/rogue-data.
37. Demuth, J.P. *et al.*, The evolution of mammalian gene families, *PLoS One* 1(1):e85, 2006.
38. Doyle, S., Cladistics, evolution and the fossils, *J. Creation* 25(2):32–39, 2011; creation.com/cladistics.
39. Woodmorappe, J., The non-transitions in ‘human evolution’—on evolutionists’ terms, *J. Creation* 13(2):10–12, 1999; creation.com/non-transitions.
40. Grigg, R., Missing the mark: How a missionary family gave rise to the top name in ‘apeman’ research (Louis Leakey)! *Creation* 26(3):24–27, 2004; creation.com/leakey.
41. See Bell, P., *Homo habilis* hacked from the family tree: New hominid fossils have ‘completely changed the story’ of human evolution; creation.com/habilis, 2007.
42. Line, P., Fossil evidence for alleged apemen—part 1: the genus *Homo*, *J. Creation* 19(1):22–32, 2005; creation.com/apemen1.
43. Darwin, C., *On the Origin of Species*, p. 82, 1st edn, 1859.
44. This quotation can be found in various forms online, but is generally assumed to be from Einstein.
45. Sarfati, J.D., Loving God with all your mind: logic and creation, *J. Creation* 12(2):142–151, 1998; creation.com/logic#prediction.
46. Vardiman, L., Snelling, A., and Chaffin, E., *Radioisotopes and the Age of the Earth*, vol. II, Institute for Creation Research, CA, 2005. See ch. 8 by John Baumgardner, “¹⁴C evidence for a recent global flood and a young earth”.
47. Sarfati, J., Diamonds: a creationist’s best friend, Radiocarbon in diamonds: enemy of billions of years, *Creation* 28(4):26–27, 2006; creation.com/diamonds.
48. Smith, C., Dinosaur soft tissue: In seeming desperation, evolutionists turn to iron to preserve the idea of millions of years, creation.com/dinosaur-soft-tissue, 28 Jan 2014.
49. Anderson, K., *Echoes of the Jurassic*, CRS Books, Chino Valley, CA, 2016; see creation.com/triceratops.
50. See Sanford, J., Critic ignores reality of Genetic Entropy: The author of a landmark book on genomic decay responds to unsustainable criticisms, creation.com/genetic-entropy, 7 Mar 2013.
51. Tomkins, J. and Bergman, J., Genomic monkey business—estimates of nearly identical human–chimp DNA similarity re-evaluated using omitted data, *J. Creation* 26(1):94–100, 2012; creation.com/chimp.
52. Hughes, J.F. *et al.*, Chimpanzee and human Y chromosomes are remarkably divergent in structure and gene content, *Nature* 463:536–539, 2010.
53. Carter, R.W., The chimpanzee Y chromosome is radically different from human, creation.com/chimp-y-chromosome, 16 December 2010.
54. Sanford, J.C. and Nelson, C.W., The next step in understanding population dynamics: comprehensive numerical simulation; in: Fusté, M.C. (Ed.), *Studies in Population Genetics, InTech*, pp. 117–136; intechopen.com/books/studies-in-population-genetics/the-next-step-in-understanding-population-dynamics-comprehensive-numerical-simulation.
55. ReMine, W.J., Cost theory and the cost of substitution—a clarification, *J. Creation* 19(1):113–125, 2005; creation.com/cost.
56. Rupe, C. and Sanford, J.C., Using Numerical Simulation to Better Understand Fixation Rates, and Establishment of a New Principle: Haldane’s Ratchet; in: Horstemeyer, M. (Ed.), *Proc. Seventh Int. Conf. Creationism*, Creation Science Fellowship, Pittsburgh, PA, 2013.
57. Batten, D., Clarity and confusion, A review of *The Edge of Evolution: The search for the limits of Darwinism* by Michael J. Behe, *J. Creation* 22(1):28–33, 2008; creation.com/edge-evolution.
58. Luskin, C., Intelligent Design and the Origin of Biological Information: A Response to Dennis Venema, *Evolution News & Views*, 3 Oct 2011.
59. Nelson, C.W. and Sanford, J.C., The effects of low-impact mutations in digital organisms, *Theoretical Biology and Medical Modelling* 8:9, 18 April 2011.
60. Carter, R.W. and Powell, M., The genetic effects of the population bottleneck associated with the Genesis Flood, *J. Creation* 30(2):102–111, 2016.
61. Carter, R.W., The non-mythical Adam and Eve! Refuting errors by Francis Collins and BioLogos, creation.com/biologos-adam, 20 Aug 2011.
62. Halley, K., John Walton reimagines Adam and Eve, *J. Creation* 29(2):47–51, 2015.
63. Smith, C., The Sin of Certainty—A book review: Telling Christians you can’t trust the Bible (but you should trust God anyway), creation.com/sin-certainty, 14 June 2016.
64. Turner, R., Where did Paul get his authority? carm.org/paul-authority, undated.
65. For a far superior discussion, see Cosner, L., Romans 5:12–21: Paul’s view of a literal Adam, *J. Creation* 22(2):105–107, 2008; creation.com/romans5.
66. Smith, H.B., Cosmic and universal death from Adam’s Fall: An exegesis of Romans 8:19–23a, *J. Creation* 21(1):75–85, 2007; creation.com/romans8.
67. Cosner, L., Evolutionary syncretism: a critique of BioLogos, creation.com/biologos, 7 Sep 2010.

Design by intuition: good biology, naive philosophy

Undeniable: How biology confirms our intuition that life is designed

Douglas Axe

HarperOne, San Francisco, CA, 2016

Joel Tay

Douglas Axe is the director of the Intelligent Design (ID) group, Biologic Institute (not to be confused with the theistic evolutionary syncretistic group, BioLogos) and a molecular biologist by training. In *Undeniable*, Douglas Axe has written an Amazon top-selling book addressing how biology confirms our intuition that life is designed. By appealing to probability, Douglas Axe gives numerous examples showing why naturalistic evolution is not only improbable, but scientifically impossible.

The book is written for the non-scientist. For this reason, much space has been devoted to the use of elaborate analogies in order to simplify complex technical details. Interwoven between these analogies are personal stories and an overall narrative approach to the book. At times, this causes the book to come across as slow, repetitive and unnecessarily drawn out.

For lack of a better comparison, if one were to compare the writing style of *Undeniable* with Jonathan Sarfati's *By Design* (2008)—both books discussing design—the feel is that one chapter of *Undeniable* would have the same amount of scientific content as two or three pages in Sarfati's book, with the latter being far more concise and easy to understand. Apart from the excessive wordiness, the science contained in *Undeniable* is sound,

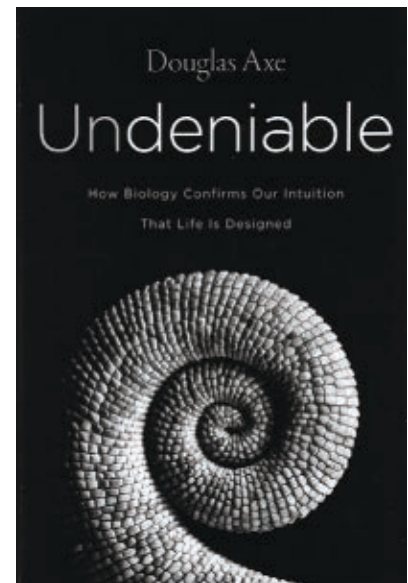
though it falters when it comes to its philosophy of science. This book will prove to be a challenge for those who hold to naturalistic evolution.

Philosophically naive

Unfortunately, as it is with most ID books, *Undeniable* comes across as somewhat epistemologically naive. Axe correctly draws a distinction between creationists and the ID movement. At times throughout the book, Axe even appears to hold to contradicting philosophical positions. For example, he rejects scientism on the basis that our intuition tells us that design requires a designer (p. 49) yet at the same time rejects the inference to God by creationists since “Intelligent Design takes a minimalist view”, and there is a jump from intelligent designer to God (p. 50) that goes beyond science.

But if one cannot infer beyond science, then how is one not stuck with scientism? Either we infer beyond science, or we are stuck in scientism (which Axe also rejects). A naturalistic intelligent designer is still a designer within naturalism. But if the designer is not naturalistic, then one must infer beyond the boundaries of mere science. Worse, towards the end of the book, Axe himself does what he says creationists ought not to do, by saying that the designer only makes sense if it is God.

It is necessary to understand the limitations of science as an epistemological enterprise. Using a presuppositional approach, the biblical creationist starts by deducing propositions about creation and God from the Bible. He might use inductive inferences in building scientific



models, but since induction is always a formal logical fallacy, scientific models are always held loosely and never elevated to the same epistemic level as Scripture. This is the reason why there are often multiple scientific models that may be invoked to explain any given phenomenon, and why scientific models themselves are often discarded when further scientific research is carried out. This is also the reason why it is necessary to hold to biblically deduced propositions authoritatively and scientifically inferred models loosely.

The Bible provides the epistemological justification for the Christian's claim for truth. Why is truth knowable? Why can man know that the logic he uses in all that he does is trustworthy as a means of obtaining truth? The biblical creationist can appeal to Scripture as his foundation. The Bible tells us that God is Truth. It tells us that God revealed truth to man through His Son, and man can understand the truth and either accept or reject it (John 1). So the Scripture provides an epistemic foundation for why man can know truth. The existence of God is not something that is induced/inferred. Rather, it is something that is deduced

from the propositions of Scripture. However, the ID approach (as it is with *Undeniable*), operates solely on the shaky epistemic foundation of induction/inference. Thus, it has an epistemologically unstable foundation.

Axe declares that

“... we must accept that objective truths exist, as we all naturally do. Then we must accept that some of these truths pertain to the physical world, and that some of those can be discovered through human observation and reasoning” (p. 48).

But how can we know that what we claim to be true is indeed true? How can we know that logical thinking is trustworthy as a means of obtaining truth; or that what we call *Logic* is not merely an approach that provides a selective advantage? The sense one gets from reading the book is that the author thinks that the evidence speaks for itself and this is the basis for what he later calls ‘common science’, and ‘design intuition’. There is hardly any discussion on how presuppositions shape the way one interprets the evidence.

Throughout the book, Axe repeatedly appeals to how we know there is a designer based on what he calls a “universal design intuition” [*sic*]. Axe’s rejection of scriptural presuppositions means that he cannot appeal to passages like Romans 1:18–20 for an epistemic foundation. Thus, he is left with an argument ‘from intuition’. As an epistemic foundation, this comes across as philosophically naive.

The science

Fortunately, the science in the book is excellent. If there is anything I dislike about the science, it would be that some of its analogies are over simplistic; but this is understandable since one of the objectives of *Undeniable* is to explain complex scientific concepts to the lay reader.

Chapter details

Chapter 1

After a brief introduction in chapter 1 of how he came to be involved in ID research and some personal anecdotes on the persecutions he has experienced for doubting evolution, Axe introduces his *design intuition* in chapter 2.

Chapter 2

Imagine filling a large pot with alphabet-shaped pasta and boiling it into a soup. Would we expect to see the pasta letters forming complete instructions for building something new and useful that is worthy of a patent? Of course no one would believe this can happen. This is what Axe calls the universal design intuition. We all recognise that “tasks that would need knowledge to accomplish can be accomplished only by someone who has that knowledge” (p. 20).

Chapter 3 and 4

Axe distances the ID movement from the creationist movement. He argues that science does not require scientism/materialism. Axe rejects creationism because it presupposes a particular understanding of Genesis and then seeks to reconcile science with it. On the other hand, ID starts with science alone and follows its conclusion to an intelligent designer because of what we know from scientific principles. He emphasizes that we cannot jump from an intelligent designer to God because that requires us to go beyond science.

In other words, Axe rejects the possibility of ID leading us to any theological conclusion. Instead, Axe argues for the intelligent designer based on intuition. To be fair, when Axe speaks of intuition, he usually first discusses mathematical improbabilities, and from there, intuitively that there must be an intelligent designer. Axe clearly rejects the

presuppositional approach of the creationist movement. Unfortunately, later in the book, Axe inconsistently does what he claims we should not do—he claims that God is the best explanation for the intelligent designer.

Axe compares the alphabet soup analogy in the earlier chapter with gene sequences and proteins. He uses the analogy of a car: the proteins are the mechanical parts of the car and are essential to life. The information for making these proteins are written in the DNA based on a four-letter genetic code. These are too complex to be accounted for without an intelligent designer.

Axe then narrates how his involvement in ID resulted in him eventually losing his job. The real problem, according to Axe, is not about having agendas, but the institutionalization of agendas, where those who hold to minority views are actively suppressed.

Chapter 5

Axe recalls how Michael Denton wrote that accidental processes would be incapable of forming new functional proteins if their amino-acid sequences were rarer than one in 10^{40} . Axe’s research showed that one such protein sequence would appear for every 10^{74} wrong ones— 10^{34} -fold rarer than Denton’s criterion. This deals a decisive blow to the idea that proteins arose by accidental causes.

Axe introduces the phrase “common science”: everyone validates their design intuition through first-hand experience. This experience is scientific in nature because we all make mental notes of what we observe, and then build conceptual models of how things work. Hence, since this is broadly defined as ‘science’, all humans are in this sense ‘scientists’. Aside from technical issues, “people who lack formal scientific credentials are nonetheless qualified to speak with authority on matters” of the world around them. This is what Axe calls common science (p. 64).

Chapter 6

In this chapter, Axe introduces the phrase ‘whole project’ and ‘busy whole’. A whole refers to something that is more than just a sum of its parts. For example, a spider or a pool cleaning robot is a whole. If you divide a spider into its parts, you will not get a smaller spider. In contrast, a cloud or a rock is not a whole because if you divide it up, you will get smaller rocks or clouds.

Axe also makes a distinction between different kinds of wholes. For example, he calls things that look as if they are trying to accomplish something ‘busy wholes’. A ‘busy whole’, then, is “an active thing that causes us to perceive intent because it accomplishes a big result by bringing many small things or circumstances together in just the right way” (p. 68). Living things are example of ‘busy wholes’. When we see a ‘whole project’, our design intuition causes us to recognise the need for skilled work, and for the need of discernment to decide between right and wrong things. Discernment in turn requires knowledge, which then in turn requires a knower. Similarly, when we look at

the human body and see how all the different systems and organs come together, we can intuit that there was an intelligent designer.

Axe gives the example of two enzymes, *Kbl* and *BioF*, which are functionally different yet strikingly similar in structure. The goal was to see if one enzyme could evolve to the other. His conclusion was that this was mathematically improbable. Therefore, mutations alone cannot account for the complexity we see in whole systems. Furthermore, natural selection can only select what is already first present. Thus, natural selection also cannot be used to account for what we see in nature.

Chapter 7

Imagine that there is a noise-seeking robot that is dropped randomly on Earth and its purpose is to find the closest football stadium by tracing the source of the loudest noise. If it is fortunate, it will be dropped near a football stadium so that it does not need much effort to find the stadium by following the loudest noise. However, what are the

chances that a randomly dropped robot would be near a stadium? If it is too far away, competing noises from nearby sources might be louder than a faraway stadium, and the robot would be led to the wrong location.

How does this relate to evolution? Natural selection, according to Axe, is like the homing system of the noise-seeking robot. It only moves a species towards an existing ‘fitness signal’. But natural selection has a problem when dealing with complex structures. For example, for lungs or hearts to function, there is a need for many other small components to come together on their own via natural selection. But if each smaller component itself does not confer any distinct advantage individually apart from the whole, natural selection cannot move it in the right direction. It would be like one of these noise-seeking robots that has been dropped so far from a stadium that no noise could be detected. It takes insight to put together all the parts necessary for something like a heart. Axe finds it hard to see how this can be attributed to accidental causes.

Chapter 8

Can inventions happen by chance? Imagine Earth as our search area, and our target is a small indentation on a plaque on the ground that lies between the boundaries of Colorado, Utah, New Mexico, and Arizona (figure 1). If we drop 2,000 pins at random all over Earth, what is the chance that a pin would land in our target spot?

Using another analogy, Axe asks the reader how many possible images can be stored on a 300 pixel by 400 pixel image. The number would be a single line of numbers stretching across 198 pages. In comparison, all the atoms in the universe can be represented with an 80-character line of text.

Axe likens these examples to what we see in nature and concludes that

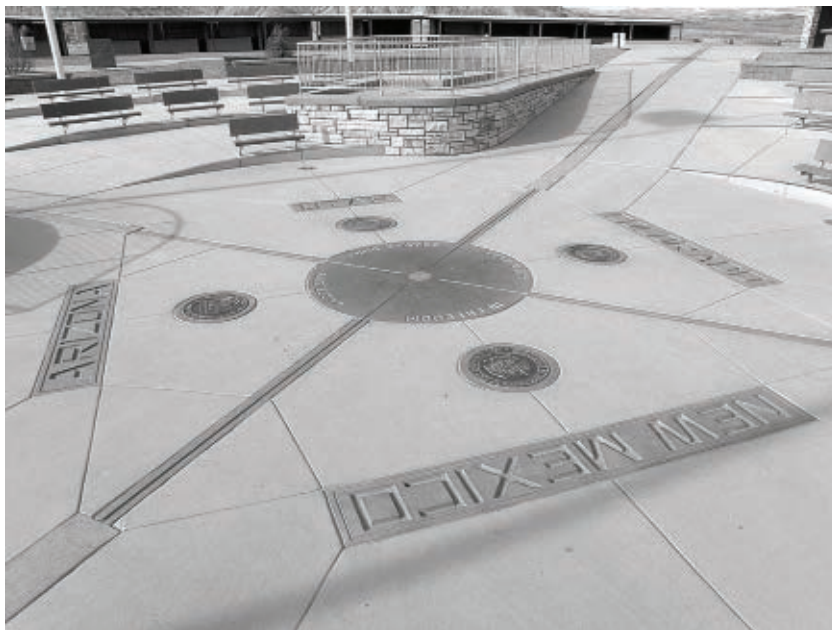


Photo: Rich Torres, Four Corners Monument, Wikipedia

Figure 1. Plaque that lies on the boundaries of Colorado, Utah, New Mexico, and Arizona

the probability for random chance to explain what we observe is so remotely improbable that it requires more coincidences than the whole universe could physically produce. While it is theoretically possible for extremely remote possibilities to happen, we should reject it if we find it to be practically impossible (p. 117).

Chapter 9

Invention requires three stages. The mental stage where the concept is thought out, the methodical stage where the details are planned out, and the mechanical stages where the details are implemented. Invention is thus a top-down, deliberate action.

Axe coins the phrase “functional coherence”. This is defined as “the hierarchical arrangement of parts needed for anything to produce a high-level function—each part contributing in a coordinated way to the whole” (p. 144). To illustrate this, imagine alphabets. We can arrange alphabets to type out a word that has a basic meaning. To go one level higher in the hierarchy, we would need to arrange words in a certain grammatical order in a sentence in order to convey an intelligent message.

If my intention were to convey to my readers an extended thought process, I might need to take this even one level higher, so that I have many sentences, “each carefully crafted out to make its own point in a way that coheres with the preceding points and paves the way for subsequent points” (p. 145).

All these different sentences arranged together in a multi-level hierarchy forms what Axe calls functional coherence. According to our design intuition, such instructions can only come “from someone who has a mental grasp of the procedure being conveyed and of the language in which it’s to be conveyed” (p. 145). For random keystrokes on a keyboard to produce a half page consisting of

actual words, the chance is one in a number that would take 11 lines to type out. In contrast, the number of atoms in the universe would only take two lines to type out. In other words, high-level functional coherence cannot result from a random chanced process.

Chapter 10

“Unlike human inventions, living inventions are all-or-nothing wholes. Every cell in the body both sustains the body and is sustained by the body. Life is never anything but whole” (p. 178).

Axe goes through several examples in living things and concludes that living things display functional coherence at a scale that is beyond human ingenuity. Functional coherence in nature undermines evolution.

Axe concludes that nature can only be reasonably explained as having come from the mind of God—nothing else makes sense (p. 185). This statement is especially perplexing, since earlier in the book, he attacks creationists for a deficient logic when they jump from an intelligent designer to God.

But this accusation is a strawman argument because presuppositional creationists start with biblical propositions, and then deduce God from the Scripture. They do not infer from design alone to God—so there is no ‘jump’ in logic. However, Axe rejects the presuppositional approach and instead must rely on induction and inferences from science (such as design intuition) to get to an intelligent designer—and then have a ‘jump’ in logic to get to God. So it appears that the error he wrongly accuses creationists of committing ends up being the very error he himself commits.

Chapters 11 to 14

These chapters pretty much sum up what Axe wrote in the earlier chapters with more examples from nature and some discussion on the

mind-body problem. He dismantles Dawkins’ famous “Methinks it is like a weasel” (pp. 198–204) analogy by pointing out that Dawkins knew that his example wasn’t blind evolution. Even if it was, Axe points out that it is “not that blind processes are incapable of producing any functional coherence at all but rather that they are incapable of producing it in the amounts needed for useful inventions” (p. 201). Dawkins’ selection of the Shakespearean sentence only worked on the basis of what Axe calls ‘selective optimization’; yet “Selective optimization proves valuable only by being cleverly employed by someone who knows what it can and cannot do” (p. 209). Random mutations cannot do this.

A naturalistic explanation of living things cannot explain “the origin of new species [*sic*] or even the origin of new genes” (p. 221). Instead, Darwinism assumes “the prior existence of the entities whose features it is meant to explain” (p. 221). Since evolution cannot account for how an enzyme could evolve into another form (i.e. from enzyme *Kbl* to *BioF*), it cannot explain the evolution of every life form from a supposed ancestral microbial species.

Conclusion

Overall, this is a useful book where the science is concerned, but it does not add much to what has already been discussed in ID circles. The analogies used do come across as being excessively long-winded at times. Sadly, when it comes to philosophy of science, I cannot help but find this book deficient.

Strategically dismantling the evolutionary idea strongholds

I appreciated the survey work published by Dan Biddle and Jerry Bergman in issue 31(1). I participated in a webinar by Dan Biddle about these data (facilitated by Eric Hovind), but I don't think that the conclusion, that creation speakers focus too much on attacking deep time, is warranted.

The survey was based on an Amazon exit poll that asked student-aged young people what they found to be the most convincing arguments for (biological) evolution. They were not asked what most causes them to disbelieve the Bible's history. The latter question, I'm confident, would have resulted in a quite different result.

Also, deep time is so widely accepted, it is part of the landscape for most people today, the backdrop to all other thinking, so there was no need for the students to be convinced of deep time; that was already in place, and hence its low status in terms of convincing them of biological evolution.

The importance of human evolution is interesting, but it seems at the least premature to draw the conclusion that attacking deep time is misguided.

Human evolution is certainly an 'icon of evolution' and I believe that it is good to deal with it, briefly, in talks, but it is not the main thing. Rather, the false history is the main issue, which undermines the Bible's Gospel narrative at its roots. Many don't realize that they believe a false history until it is pointed out to them. This then opens the way for them to believe the Bible's history, which includes salvation. Otherwise, our messages might convince them that biological evolution has problems, but that the overarching narrative remains

in place, which implies that the Bible's salvation story from the beginning remains a fairy tale.

Nonetheless, the authors' approach is a step in the right direction of seeking to more rigorously and objectively quantify the prime targets of creation outreach.

Don Batten
CMI Australia

» Dan Biddle and Jerry Bergman reply:

Don Batten points out the importance of the foundation of evolution—deep time—and states that our conclusion, “that creation speakers focus too much on attacking deep time”, is not warranted. We agree that creation speakers need to focus on the deep time issue. We note, in the results section of our article, that a “pronounced gap between the students and creation speakers was observed on the topic of deep time”, and we point out that deep time was “only mentioned by 4% of the student population but given a 17% weight by creation speakers”. We explained this disparity by stating: “We believe this is because creation speakers rightfully understand that radiometric dating is foundational to evolution theory in general, and therefore should be addressed in biblical creation ministry efforts.” So, we clearly note the significance of addressing deep time.

However, we have collectively found that the deep time issue is very difficult to convince people of, even those who are very educated. While we have had success in convincing people of the evidence against secular evolution, sometimes it is more difficult taking them to the next step and unwinding their deeply seated ideas about the deep time clock. I'm sure many creation speakers would agree that it's sometimes easier to talk people out of believing in traditional evolution than it is regarding the 'millions of years stronghold'. In fact, we find that many

Christians who are being awakened to the truth of creation sometimes 'retrench' to a compromised view (gap theory, progressive creation, etc.) before they will eventually settle into a 'full conversion' of the truth on creation as clearly laid out in Scripture.

Our article emphasizes that the neural network that makes up the framework of evolution that is held in the majority (72%) of our sample is made up of four topics: human evolution, Darwin's Theory, transitional fossils, and science as an authority. We have found that the ideal strategy is to integrate the issue of deep time when addressing these four key topics. For example, in the case of human evolution, we find it useful to contrast the biblical account (with man being created on the 6th day some 6,000 years ago) with the idea that humans started evolving from ape-like creatures millions of years ago (e.g. Lucy dated at 3.12 Ma). This can be easily done by reasoning if evolution really happened over millions of years, the fossil record should be full of transitions, not the scant examples of supposed transitions (such as fewer than 20 australopithecines and so few *Homo habilis* specimens they can fit into just a shoe box). The same is true with the remaining three key pillars that make up the idea of evolution in the majority of the sample. So we believe that an integrated approach is perhaps the best way, but hold fast in our conclusion that creation speakers will do more damage to the lie of evolution by focusing on these four pillars rather than on some of the other pillars that were not rated as highly as these four.

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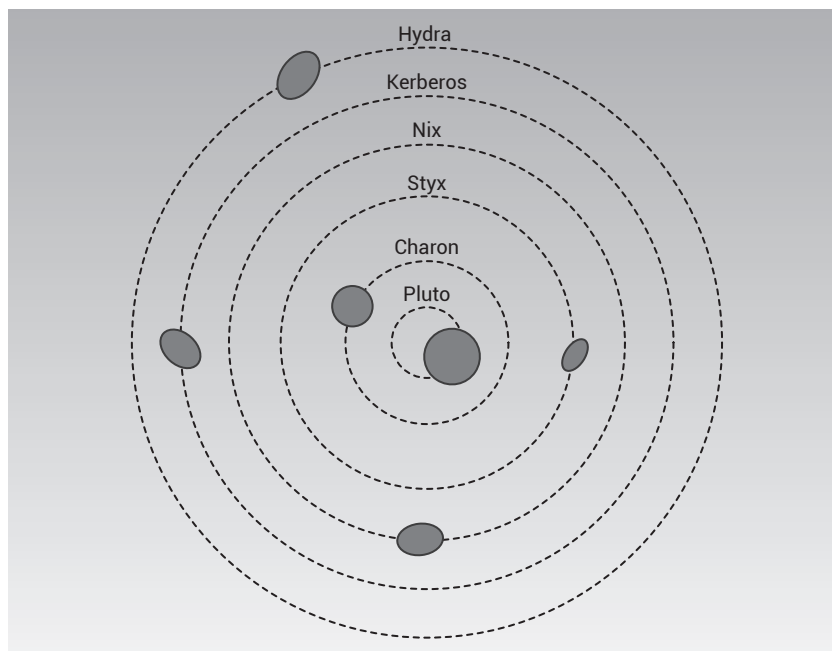
Jerry Bergman
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Even more surprises with Pluto's satellites

John Hartnett's recent article¹ on the rapid rotation of Pluto's four smaller satellites was excellent. However, I must point out that within astronomical nomenclature, the term *satellite* is preferred over the word *moon*, as the moon is the name of the earth's natural satellite. As Hartnett discussed, synchronous rotation is common among natural satellites, a characteristic that can be explained by tidal interaction on timescales of the supposed 4.6-billion-year age of the solar system. But the short rotation periods of these four satellites argue against such vast age, at least for the four satellites.

I would like to take the discussion further. Hartnett mentioned the possibility that the satellites of Pluto are captured asteroids. As I have argued for other small satellites in the solar system,² this is unlikely. We expect that capture events generally would result in highly inclined, elliptical orbits. All of Pluto's satellites have inclinations to Pluto's equator of less than a degree (while Pluto's rotation axis is tilted 122.5 degrees to its orbit around the sun). The orbits of Pluto's satellites are nearly circular. Each of Pluto's satellites has smaller orbital eccentricity than the earth does as it orbits the sun, and perhaps even less than Venus, the planet with the lowest orbital eccentricity. Thus, the orbital characteristics of Pluto's satellites argue against their being captured asteroids. The surfaces of Pluto and its largest satellite, Charon, have far lower crater density than would be expected if their ages are billions of years.³ Therefore, much evidence suggests the Plutonian system is young.

How might evolutionists respond to this? I predict they will conclude Pluto recently endured a catastrophic



Pluto/Charon and their moons (NASA/JHUAPL/SwRI/Mark Showalter)

collision that resurfaced much of Pluto and created its four smaller satellites. That is, the first discovered and best-studied trans-Neptunian object (a term I prefer over 'Kuiper Belt objects' for bodies in the solar system beyond the orbit of Neptune) supposedly is an unusual and unlikely entity. Good photographs of the four smaller satellites might help sort this out. Unfortunately, the *New Horizon* imagery of the smaller satellites was poor. Of the four smaller satellites, Nix has the highest resolution images. They are tantalizing, suggesting Nix may be heavily cratered. If that were the case, it would disprove this scenario. Clearly, the Plutonian system is a mess for the evolutionary paradigm.

However, does this mean that the creationary model is better? Perhaps not, at least as far as that model has been developed. While creationists claimed the low-crater density of Pluto as evidence of recent origin, none of us predicted this outcome. We acknowledge tidal locking can explain synchronous rotation, but that requires much more time than the recent creation model will allow. Some creationists may suggest

synchronous rotation is evidence of design; though, in most (all?) cases, no purpose has been established. And it is a tad inconsistent to discuss lack of synchronous rotation in a few instances as evidence of recent origin, while simultaneously ignoring the implication of great age for those satellites that have synchronous rotation. These considerations underscore the fact that no comprehensive model of creation astronomy yet exists. Many other questions and difficulties remain. Obviously, there is much work yet to do, and I look forward to the challenge. I also encourage others, such as Hartnett, in this endeavour.

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References

1. Hartnett, J.G., Pluto's moons a big surprise, *J. Creation* 30(2):8–9, 2016.
2. Faulkner, D.R., Anomalies with planets and satellites in the solar system—indication of design? *Answers Research J.* 7:205–214, 2014.
3. Spencer, W., Rediscovering Pluto, *J. Creation* 29(3): 3–5, 2015.

Sodom—part 1

Anne Habermehl

An unresolved question has been where the biblical cities of Sodom, Gomorrah, Admah, Zeboiim, and Zoar were located. Arguments from the Bible and geography show that these cities had to have lain along the west side of the Jordan River, north of the Dead Sea. This strip of land is shown by Google Maps to be a desolate wasteland even today, as predicted by Scripture. Arguments for other advocated locations can be shown to be flawed.

Various locations for the biblical cities of the land of Sodom have been claimed over the years, but there has been no consensus of opinion on any given site. In this paper we will examine Scripture¹ and other evidence, and will propose a new site for the land of Sodom.

When Lot looked eastward, what did he see?

In our search, we will start with Abraham and Lot, whose large herds of animals were causing friction between their respective herdsmen (Genesis 13:7). Abraham proposed a solution: they would separate. Lot would go in one direction and Abraham would go in the other. Generously, Abraham gave Lot first choice. According to Genesis 13:10–12, Lot “lifted up his eyes”² and chose the well-watered Jordan plain where the cities lay. To get there he journeyed eastward.

Abraham and Lot would have been standing not far from where their tents were pitched between Bethel and Ai³ (Genesis 13:3), as there is no indication in Scripture that they had travelled elsewhere. (Genesis 13:18 tells us that Abraham moved south to Mamre some time after this.) Those who have gone to that area and stood on all the hills around are in agreement that the maximum window of visibility that Lot and Abraham had, if they were on the highest mountain with an eastern view, was that shown in figure 1. Hills limited Lot’s view to the north and south along the Jordan when he looked eastward and saw the cities of the plain spread out below him.

We quote Collins⁴ on this window of visibility:

“I am intimately familiar with what can and cannot be seen from practically every vantage point between Ai and the edge of the Jordan Valley to the east. The southern Jordan Valley north of the Dead Sea and the foothills on the eastern edge of the Jordan Valley are easily visible from that area. On a clear day, you can even see a portion of the northern end of the Dead Sea itself. But under no circumstances or by any stretch of the imagination can you see with the naked eye beyond that point to the middle (Lisan) regions or the southern end of the Dead Sea. The vantage point of the area of Bethel and Ai is a bit of evidence that

should not be passed over lightly.”

Harper⁵ also describes what Lot might have been able to see from his vantage point (*italics are Harper’s*):

“Lot, standing on the Bethel hill, ‘saw’ the Valley of the Jordan. From *no* hill there, except one called by the Arabs ‘the Hill of Stones,’ can any view of the Jordan Valley or Dead Sea be seen; and what can there be seen is the *northern* end of the Dead Sea, the Jordan Valley, and the river running like a blue thread through the green plain. The hills of Engedi shut out completely all view of the *southern* end of the sea; but, as I before said, the northern end, where the Jordan runs in, and about two or three miles of the sea, can be seen. I have wandered over all the Bethel hills and tested this question.”

We also have testimony from Ben-Artzi⁶ that the hills around Bethel are the highest in the centre of the land. These would offer the maximum view to the east, north, and south.

Clearly the cities of the plain of Jordan must have been at the north end of the Dead Sea, because most of the Dead Sea was not visible from where Lot stood. Also, the environs of the Dead Sea do not qualify as the plain of Jordan (see this expression in Genesis 13:10–11), in spite of special pleading from those who try to show otherwise. For example, Khouri⁷ speaks of “the cities of the plain” and “the Dead Sea plain” in order to support his belief that the cities were at the south-east end of the Dead Sea. This constitutes changing what Scripture explicitly says, which is that what Lot saw was the plain of the *Jordan*.

It cannot be emphasized too strongly how important this window of visibility is to our search for the cities.

The boundaries of the land of Canaan

The cities of the plain of Jordan are listed as part of the boundaries of Canaan in Genesis 10:19 (NIV): “and the borders of Canaan reached from Sidon toward Gerar as far as Gaza, and then toward Sodom, Gomorrah, Admah and Zeboiim, as far as Lasha”.

From the context of this chapter on how the people of the earth spread out, we see that ‘borders of Canaan’ is an

expression that is meant to outline the territory of Canaan. The boundary line runs in a counterclockwise direction, starting with Sidon in the north (figure 2). The line goes southward (in the direction of Gerar) to the most southern point of Canaan at Gaza, forming the western border. It is possible that Gerar is mentioned because it was more important than Gaza at the time this was written.

As we have shown, Lot had to have seen the cities of the plain lying along the Jordan River at the north end of the Dead Sea. Because the boundary line is running counterclockwise, the four cities are therefore listed in Genesis 10:19 from south to north: Sodom, Gomorrah, Admah, and Zeboiim, strung out in a line along the Jordan River. This means that the boundary line ran from Gaza across and upward to Sodom at the north end of the Dead Sea, forming the southern border of Canaan. We will show shortly that these cities had to have been on the west side of the Jordan River.

The line then ran on northward from Sodom to Gomorrah, Admah, and Zeboiim; and finally up to Lasha in the north (also Laish or Leshem, later Dan) (see Joshua 19:47; Judges 18:29). This formed the eastern border of Canaan. The line would have continued from Lasha back to Sidon, forming the northern border. The identification of Lasha as Leshem/Dan makes geographic sense because we already have the north-west corner of Canaan as Sidon, the south-west corner as Gaza, and the south-east corner as Sodom; we would therefore expect that this last city in the list would be the north-east corner, which is where Dan is. That the early Genesis account would have a slightly different spelling of this city's name would not be unexpected, as we already have two other versions of it in Laish and Leshem. This view is supported by Wellhausen,⁸ for instance, who says that Lasha is Dan, and calls it

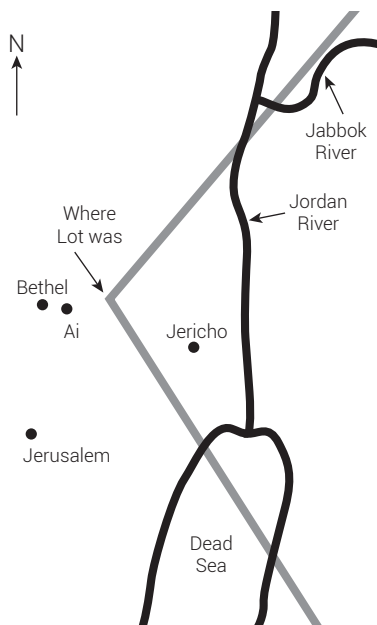


Figure 1. Map showing Lot's maximum window of visibility when he stood with Abraham at an elevation of about 900–1,000 m on a hill near Bethel and Ai, looking eastward. All the territory on the east side of the V-shaped line would have been what he might have seen. Mountains to his right and left would have limited his line of vision to the north and south. Note that at best only the north-eastern corner of the Dead Sea would have been visible to him. (After Collins⁴ and Harper⁵.)

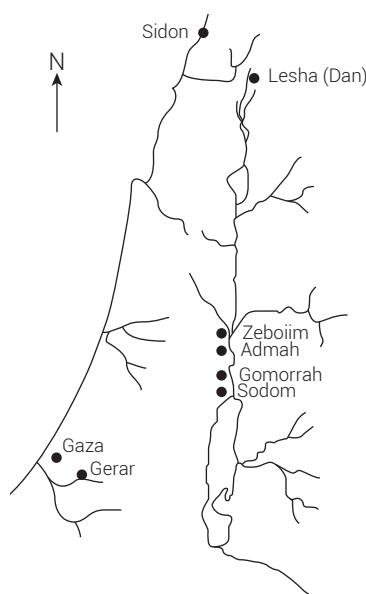


Figure 2. Map of Canaan showing the cities that defined its borders as described in Genesis 10:19 (A. Habermehl)

(translated from the German) the well-known border city in the north; he shows that only a minor emending of the Hebrew word is needed for this reading. Other writers throughout the 19th century had also believed that Lasha was Dan.⁹ The Wellhausen view has lasted right into modern times.^{10,11} I consider identification of Lasha with Dan to be a matter of simple common sense. However, some scholars debate whether Lasha could really have been the place known as Laish/Leshem/Dan, even though they do not have a suggestion for any other place.¹² In any case, Lasha has to mark the north-east corner of Canaan somewhere north of the Sodom cities. Whether or not Lasha is Dan does not affect our argument for the location of the cities of the plain.

There was one other city, Zoar, that was situated southward beyond Sodom from Lot's point of view (Genesis 13:10). It is possibly because Zoar was very small (Genesis 19:20, 22) that it was not mentioned in this early Genesis 10 listing. However, we know that Zoar was very close to Sodom. When the angels were pulling Lot out of Sodom, and trying to persuade him to go in the direction of the mountain, Zoar was "near to flee to" (Genesis 19:20). This will be a significant point later on when we are looking at various claimed locations for the cities.

Were the cities on the east or west side of the Jordan River?

Many writers claim that the Bible says that Lot crossed the Jordan River and pitched his tent on the eastern side.^{13–17} But what the passage actually says is:

"Then Lot chose him all the plain of Jordan; and Lot journeyed east ... Abram dwelled in the land of Canaan, and Lot dwelled in the cities of the plain, and pitched his tent toward Sodom" (Genesis 13:11–12).

From where Lot was standing with Abraham on that hill near Bethel and Ai, the cities of the plain lay to the east. Lot did not need to cross the Jordan to go eastward. What appears to give the impression that Lot went across the Jordan is the statement that Abraham dwelled in the land of Canaan while Lot dwelled in the cities of the plain. However, we have already seen that the cities of the plain were in Canaan.

The real question is where exactly the eastern border of Canaan was. For this we turn to Moses, who was speaking to the children of Israel when they were camped on the plains of Moab on the east side of the Jordan:

“When ye are passed over Jordan into the land of Canaan ...” (Numbers 33:51).

“When ye be come over Jordan into the land of Canaan ...” (Numbers 35:10).

From these passages we see that the children of Israel would not arrive in Canaan until they had crossed over the Jordan to the western side. In other words, because the cities of the plain were in Canaan, they lay on the *west* side of the Jordan River. Lot did not cross over to the east side of the Jordan centuries earlier when he chose the plains of Jordan.

There is a historical witness who places Sodom on the west side of the Jordan. Josephus¹⁸ tells us that the mountain behind Jericho (i.e. on the west side of Jericho) runs from Scythopolis (ancient Beth Shean) in the north down *past Sodom* and on to the far southward limits of the Dead Sea. To make the geography of the area clear, Josephus then says that there is a mountain on the other (east) side of the Jordan as well; it begins at Julias in the north and goes southward to Somorrhon, which is the bounds of Petra in Arabia (i.e. in Edom). Note that Josephus only mentions Sodom when he describes the mountain on the west side behind Jericho.

The prophecy of Hosea

We now turn to Hosea to determine more exactly where the cities lay along the Jordan River. In Hosea 11:8 (NIV), the prophet says to Ephraim: “How can I treat you as Admah? How can I make you like Zeboiim?” Note that only the two cities of Admah and Zeboiim are included in this prophecy. This is significant, because Sodom and Gomorrah are mentioned more often in Scripture than Admah and Zeboiim.

To make sense of this mention of Admah and Zeboiim, we need to look at the map of allotments of land to the tribes of Israel when they entered the Promised Land (see figure 3). We see that Ephraim’s territory was directly north of Benjamin’s, and that both territories bordered on the Jordan River. Because the prophet was addressing Ephraim, we would expect that Admah and Zeboiim were in Ephraim’s allotment, north of the border with Benjamin. Therefore

Zoar, Sodom and Gomorrah in that order from south to north would be located south of the Ephraim-Benjamin line. This would result in the cities’ lineup as shown in figure 3.

Then Hosea says in 11:9 (NIV): “nor will I destroy Ephraim again”. Because this statement is in the verse immediately after the mention of Admah and Zeboiim, it would be logical to say that this reference is to the destruction of those two cities by fire and brimstone many centuries earlier.

Hosea prophesied in the era of the divided kingdom, over 600 years after the tribal allotments were made, but the line between Benjamin and Ephraim had remained the same. Benjamin had joined with Judah to form the southern kingdom, while Ephraim had joined the rest of the tribes that formed the northern kingdom (II Chronicles 11:1).

Significance of Zoar/Bela

Although Zoar was a very small city, it is of some importance in the story of the destruction. Zoar’s other name was Bela (Genesis 14:2,8). So which name came first? It is widely believed that it was originally called Bela, and then was called Zoar later on¹⁹. It is suggested here that Zoar was the original name of this little city, and that the biblical comment about why it was called this name is misread. The meaning of Genesis 19:22 would therefore be: “This city was called Zoar because it was a very little city.” This would make sense because Zoar was a very little city situated right next to Sodom.

If Zoar was its original name, then why might it later have been called Bela? If we look again at the allotments of the Promised Land, we see that Zoar was on the eastern

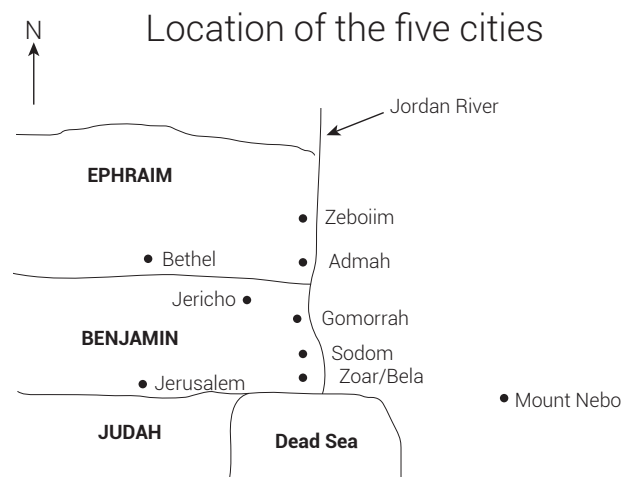


Figure 3. Partial map of the land allotments of the children of Israel, showing placement of the five cities of Zoar, Sodom, Gomorrah, Admah, and Zeboiim along the west side of the Jordan River from south to north (A. Habermehl)

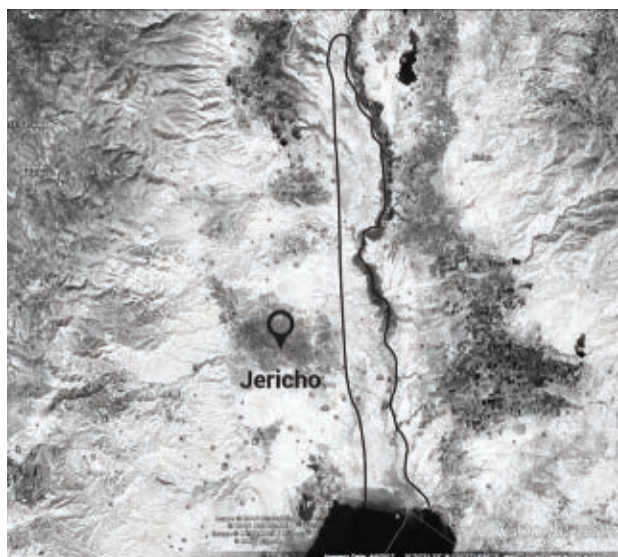


Figure 4. Google map showing the narrow strip of wasteland along the west side of the Jordan River (see drawn outline) where the land of Sodom would have been. Its maximum length would have been about 28 km and maximum width, about 3 km.

border of the territory of Benjamin. Bela was the name of the oldest son of Benjamin (1 Chronicles 8:1); therefore this city was probably renamed after this tribal father at the time of the conquest. We note that almost two thousand years after Sodom's destruction Josephus²⁰ says "king of Bela", and not 'king of Zoar'. This would support Bela as the later name.

From Mount Nebo God showed Moses the Promised Land in a counterclockwise direction ending at "the plain of the valley of Jericho ... unto Zoar" (Deuteronomy 34:1–3). This appears to be the last mention of Zoar/Bela located on the Jordan plain north of the Dead Sea in Scripture. It is probable that all references to Zoar in later historical times refer to the city of Zoara at the south end of the Dead Sea (today called Safi). Josephus²¹ says that the Dead Sea extends as far as "Zoar, in Arabia". This is often mistakenly quoted to 'prove' that Josephus thought the cities of Sodom were at the south end of the Dead Sea²². (We will look at two Scripture references to Zoar/Zoara in Isaiah and Jeremiah later on.)

We are making the point here that Zoar/Bela at the north end of the Dead Sea and Zoar/Zoara at the south end of the Dead Sea were two different cities and we must not confuse them.

Josephus²³ said that in his day, two thousand years ago, "the traces (or shadows) of the five cities are still to be seen". We might wonder why he said 'five' when, in fact, we know that only four cities were destroyed by fire and sulphur. This would appear to imply that by Josephus' time Zoar/Bela had also been destroyed.

What would the cities' territory look like today?

It was not only the actual cities that were destroyed, but also the land around them, as we see in Genesis 19:25: "and he overthrew those cities, and all the plain, and all the inhabitants of the cities, and that which grew upon the ground".

There are two verses that describe the land of Sodom as we would expect to see it today. The first is Deuteronomy 29:23 (NIV):

"The whole land will be a burning waste of salt and sulfur—nothing planted, nothing sprouting, no vegetation growing on it. It will be like the destruction of Sodom and Gomorrah, Admah and Zeboiim, which the LORD overthrew in fierce anger."

This is part of Moses' speech to the children of Israel before his death, outlining curses that would come on them if they did not follow God. Sodom's desolation was to be a picture of what might happen to the land. When Moses said this, the destroyed cities of Sodom and Gomorrah would have been just across the Jordan River opposite the people, and the children of Israel may well have been able to see them.

The second is Zephaniah 2:9: "Surely Moab shall be as Sodom, and the children of Ammon as Gomorrah, even the breeding of nettles, and saltpits, and a perpetual desolation".

This prophecy spoken against Moab and Ammon²⁴ would have described the territory around Sodom and Gomorrah at the time of Zephaniah in the 7th century BC, over 1,200 years after the destruction. Note that this state of desolation for Moab, Ammon, Sodom and Gomorrah was to last forever. We would therefore expect the site of the kingdom of Sodom to look desolate even today, with nothing green growing on it.

To test this thesis, let us look at the south end of the Jordan River via Google Maps. On the Google Maps website we type 'Jericho' into the locator slot. The Google world map will turn and bring up the strip of land along the Jordan River where we are looking for the cities of the plain (figure 4). On the west side of the Jordan River there is a sand-coloured strip where nothing is growing; this strip stretches from the north end of the Dead Sea up to just north of modern Gilgal (near Fasa'il). It is about 28 km long x 3 km wide. You can zoom in this area as close as you like, until individual buildings show up elsewhere on the map—there is *nothing* there. If this strip is the land of Sodom, the prophecies are correct even today in their assessment of its state of desolation.²⁵

Because the cities' destruction occurred very early in history, they would not necessarily have been situated on mounds formed from previous layers of occupation (called tells), as is commonly the case in the Near East. Indeed, if there were previous layers, it is possible that the fierce fire of God burned not only the current cities of Abraham's time,

but also any earlier layers beneath. However, we have no way of knowing any of this unless the sites are located and excavated. (There is another example in Scripture of fire from the Lord in I Kings 18:38, when Elijah called on God to send fire as a witness. That fire burned not only the sacrifice and wood, but also the stones, dust and water in the trench, clearly not a normal fire.) We also quote II Peter 2:6: “And turning the cities of Sodom and Gomorrah into ashes... ”

When the children of Israel crossed the Jordan to the western side, they did not stop at the edge of the river, but instead camped further on at Gilgal, east of Jericho (Joshua 4:19). In this spot they would have been just west of the strip of wasteland that had been part of the country of Sodom.

Fraas²⁶ reports that there was an unusual “sulphur ground” along the west side of the Jordan, north of the Dead Sea. Sulphur balls encased in lumps of clay were spread over quite a large area. At the time, there were those who suggested that this could have been from the Sodom destruction event, but Fraas did not accept this explanation “for geological reasons”. Whether or not these sulphur balls had anything to do with the destruction of the cities we cannot say. But they are an interesting phenomenon and they are located where we are looking for the land of Sodom.

Where did Abraham stand to view the rising smoke of the destroyed cities?

Many sources incorrectly claim that Abraham saw this sight from his tent in Mamre²⁷. But this is what Scripture says:

“And Abraham gat up early in the morning to the place where he stood before the Lord: and he looked toward Sodom and Gomorrah, and toward all the land of the plain, and beheld, and, lo, the smoke of the country went up as the smoke of a furnace” (Genesis 19:27–28).

This place where Abraham had stood with the Lord the day before was where the Lord, the two angels and Abraham had paused after leaving Abraham’s tent. As a good host, Abraham had insisted on seeing the men on their way toward Sodom after the meal (Genesis 18:16 and 19:27–28). The two angels then parted from the Lord and Abraham and went toward Sodom, but Abraham “stood yet before the Lord” (Genesis 18:22). After that conversation, “Abraham returned unto his place” (Genesis 18:33).

We do not know exactly where this spot was, where Abraham had stood before the Lord. We know only that from it he could see the smoke from the plain of Sodom.²⁸ With Sodom placed at the northern end of the Dead Sea, Abraham would have headed northward from Mamre and would have stood at a spot along the spine of the mountain west of the Dead Sea to gaze toward the north-east at the smoke. It must

have taken him some time to get there, because he rose at dawn and the fiery rain of destruction had already taken place when he arrived at this vantage point.

Criteria for location of the Sodom cities

Below we list the biblical criteria derived above:

1. Lot had to be able to see the cities from the Bethel/Ai area (Genesis 13:10–12)
2. The cities were located in the plain of the Jordan River (Genesis 13:10–12)
3. The cities were situated north of the Dead Sea (Genesis 13:10–12)
4. The cities were in Canaan (i.e. west of the Jordan River) (Numbers 33:51; 35:10)
5. Their correct order from south to north along the Jordan River was Sodom, Gomorrah, Admah, and Zeboiim (Genesis 10:19)
6. Admah and Zeboiim lay along the eastern border of Ephraim’s land allotment (Hosea 11:8–9)
7. Sodom, Gomorrah and Zoar/Bela lay along the eastern border of Benjamin’s land allotment (this was directly south of Ephraim’s allotment)
8. Zoar/Bela was very near to Sodom (Genesis 19:20)
9. The territory where these cities lay remains a wasteland today (salt, sulphur, nettles) (Deuteronomy 29:23; Zephaniah 2:9).

Keeping these criteria in mind, we will now look briefly at some of the places that have been promoted as cities of the plain over the years. The much-touted site at Tall el-Hammam, east of the Jordan opposite Jericho, will be discussed in part 2.

The Madaba Map and Zoora

Many scholars believe that the ruins of the cities lie south or south-east of the Dead Sea. Some hang their arguments on an ancient sixth-century mosaic map in a church in Madaba, Jordan, not too far from Mt Nebo²⁹ (figure 5—map of Madaba).

This map is mentioned so much in the literature sources that we might think that it must have something authoritative about Sodom on it. It does not. What it has is a city called ‘Zoora’ located at the south-east end of the Dead Sea. This name appears to be the Semitic equivalent of Zoar in Hebrew.³⁰ Today this city is called ‘Safi’ or ‘es-Safi’ in the Hashemite Kingdom of Jordan; the name of the ancient archaeological remains there is Khirbet Sheik ‘Isa.^{31,32} ‘Lot’s Cave’ is also marked on this ancient map near Zoora, presumably because the monks believed that if Zoora was Zoar/Bela of the land of Sodom, Lot’s cave had to be nearby. The Madaba map was made about 2,500 years after the

destruction of Sodom, giving plenty of time for Sodom traditions to have moved to the south-east of the Dead Sea. As discussed earlier, Zoar in the land of Sodom was not the same city as Zoora in south Moab. It is not surprising that more than one city might be called Zoar/Zoora, because the meaning of the word is ‘smallness’.³³ Any very small city could have had this name.

We noted earlier that Zoar/Bela of the land of Sodom does not appear to have been mentioned in Scripture after Moses’ view of the Promised Land in Deuteronomy 34:1–3. However, there are two references to a place called Zoar in the prophets:

“... his fugitives shall flee unto Zoar” (Isaiah 15:5).

“... from Zoar even unto Horonaim” (Jeremiah 48:34).

Because of the geographical context of the other nearby cities mentioned in these verses (Luhith and Horonaim in Moab), these two references to Zoar would have to be to this Zoora at the south-east side of the Dead Sea^{34–36} and not to the Zoar of the land of Sodom north of the Dead Sea.

Bab Edh-Dhra, Numeira, Safi, Feifa, and Khanazir

These five ancient ruins, lying along the south-eastern side of the Dead Sea in the Hashemite Kingdom of Jordan, are currently identified by Steve Austin of The Institute for Creation Research (ICR) and Bryant Wood of Associates for Biblical Research (ABR) as the sites of the cities of the plain (figure 6).^{37,38} Their reason for choosing these cities is that they believe that Zoora/es-Safi at the south-east end of the Dead Sea is Zoar of the land of Sodom; therefore other ancient sites in the vicinity must be the other four cities.

These sites do not qualify as cities of the plain under most of the above criteria:

- They are not lying in Lot’s visibility window because they are much too far south³⁹
- They are not situated along the Jordan river, and therefore are not in the plains of the Jordan
- They are not north of the Dead Sea
- They are not in Canaan (i.e. they are not on the west side of the Jordan River)
- They are not in the right order from south to north
- Feifa (“Admah”) and Khanazir (“Zeboiim”) are not in Ephraim’s allotment
- Safi/Zoora (Zoar), Bab Edh-Dhra (“Sodom”) and Numeira (“Gomorrah”) are not in Benjamin’s allotment
- Safi/Zoora (Zoar) is about 28 km from Bab Edh-Dhra, too far from Sodom.

It is most unlikely that Lot and his family would have rushed the 28 km from Bab Edh-Dhra/‘Sodom’

past Numeira/‘Gomorrah’ to get to Safi/Zoar, while the angels waited impatiently to start the destruction. Lot had told the angels that “this city is near to flee unto” (Genesis 19:20), and it does not strike me that 28 km is ‘near’. Also the rain of sulphur fire from heaven would have had to be split into two separate segments, because Zoar/Zoora, which did not get destroyed, was geographically situated in the middle of the line of five cities. This split would have additional implications if the destruction was the result of an earthquake or other natural disaster, as some claim, rather than being a purely supernatural event.

Proponents of these sites also have to interpret Genesis 19:23 to say that the sun was high overhead when the destruction started, to allow enough time for this 28 km dash to Safi/Zoar. Based on this interpretation, Austin claims that Lot had six hours to get to Zoar from Sodom before the destruction started.⁴⁰ However, the Septuagint (NETS) says “The sun came out on the earth, and Lot entered into Segor (Zoar)” (Genesis 19:23), which would appear to indicate that the sun had just risen. Also Abraham, having gotten up early in the morning, reached the place where he had stood before the Lord the day before, and the destruction was already over (Genesis 19:27–28).

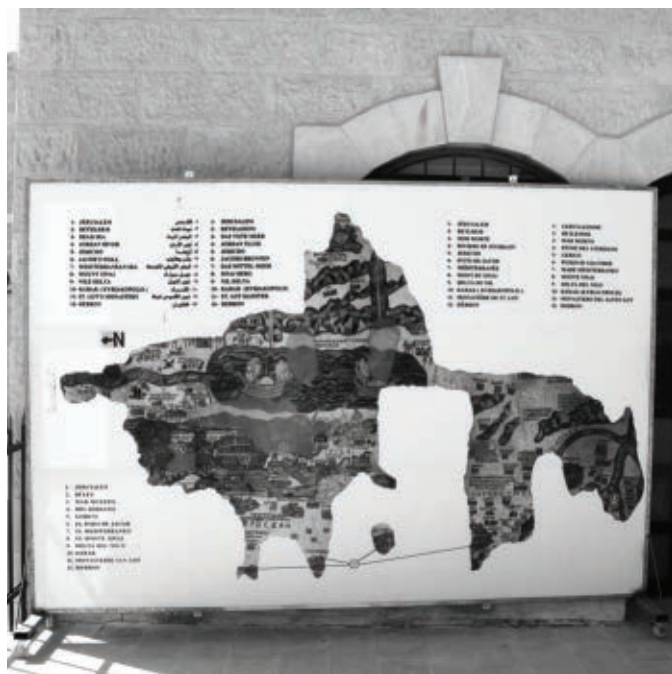


Figure 5. A reproduction of the famous sixth-century mosaic map of the Dead Sea area is displayed in front of the Church of Saint George in Madaba, Jordan. The actual conserved mosaic is on the floor of the church inside; the missing parts have been damaged and lost over the years. The map is displayed with north to the left, so that the Dead Sea lies in a horizontal direction, with the Jordan River entering it from the left. (A. Habermehl).

Other claimed locations for the cities

A search for information on the cities of the Jordan plain retrieves many people who have made claims about various locations over the years. We will touch on only a few here; anyone interested can easily find others. Application of the criteria listed above will show why none of these other suggested locations could be seriously considered.

The famed W.F. Albright theorized in the 1920s that the cities must be under the south end of the Dead Sea.³¹ This belief was widespread for many years, and I grew up believing that if only the Dead Sea would go down far enough, the missing cities would certainly be found. Although the Dead Sea has now lowered to its minimum level in history, and the section south of the Lisan Peninsula is nothing but evaporation pools, the cities have not appeared. Unger⁴¹ was quite certain that the cities were in the Vale of Siddim under water at the southern end of the Dead Sea. Sarna⁴² shows just three of the cities (Sodom, Gomorrah, and Zoar) under water south of the Lisan peninsula, on the eastern side. (Where Admah and Zeboiim were is a question that he leaves up in the air.)

The Sodom-underwater belief lost popularity when, in the mid-70s, Rast and Schaub⁴³ (1974) proposed that the cities were actually on land along the south-eastern side of the Dead Sea. These sites are called Bab Edh-Dhra, Numeira, Safi, Feifa, and Khanazir today, and are the same ones that Austin and Wood are currently promoting, as discussed earlier.

The geologists Neev and Emery⁴⁴ believed that the cities were located around the edge of the south end of the Dead Sea, but had their own take on the subject. First, they said it was a mistaken belief that Zoar/Zoora was es-Safi, and instead they placed biblical Zoar at Bab ed-Dhra (!). They put the city of Sodom near Sedom at the south-west corner of



Figure 6. The five locations of ancient ruins at the south-east end of the Dead Sea are identified as the cities of the plain by Austin and Wood. North of the Dead Sea, opposite Jericho, is el-Hammam, identified as Sodom by Collins and Byers, to be discussed in part 2. (A. Habermehl).

the Dead Sea. This meant that Lot and his family had to rush 25 km across the south end of the Dead Sea flats, a feat that Neev and Emery deemed possible because they believed that the south end of the Dead Sea was dried up at that time. Their chart of historical fluctuations of Dead Sea levels shows a couple of minimums that could have produced this dry land.⁴⁵ This chart, however, does not account for timeline revision, a subject that will be discussed in part 2.

Ron Wyatt, who found vast hills of sulphur west of the Dead Sea, claimed that these were the destroyed cities.⁴⁶ He had the right idea: he lined them up correctly from south to north, and showed them as a border of Canaan. He also showed Zoar close to Sodom. But he forgot that Lot could only see the most northern one, Zeboiim, and possibly Admah, and that the cities should all be spread out along the Jordan River, and not along the Dead Sea.

Summary

It is most likely that the ruins of the cities of the plain are located along a narrow strip of wasteland on the west side of the Jordan River, just north of the Dead Sea. This conclusion is arrived at mainly from the various mentions of the cities from Scripture. It is shown that other claimed locations around the Dead Sea cannot be Sodom.

References

1. A straightforward interpretation will be taken of Scripture, according to the principles laid out in Habermehl, H.A., *God Has Spoken But What Has He Said? A coherent guide to interpreting the Bible for yourself*, Antiphon Books, Cortland, New York, 1995.
2. All biblical references are from the KJV unless otherwise stated.
3. There is debate about the locations of Bethel and Ai. However, the various places under consideration lie within a very small area, and do not affect Lot's window of visibility. See for example, Livingston, D., Location of biblical Bethel and Ai reconsidered, *Westminster Theological J.* 33(1):20–44, 1970; and Wood, B.G., The Search for Joshua's Ai; in: Hess, R.S., Klingbeil, G.A., and Ray, P.J., Jr. (Eds.), *Critical Issues in Early Israelite History*, Eisenbrauns, Inc., Winona Lake, IN, pp. 205–240, 2008.
4. Collins, S., The geography of the cities of the plain, *Biblical Research Bulletin of The Academic J. Trinity Southwest University* 2(1):1–17, 2002.
5. Harper, H.A., *The Bible and Modern Discoveries*, 4th edn, Committee of the Palestine Exploration Fund, London, UK, pp. 16–17, 1891.
6. Ben-Artzi, H., "He named that site Bethel," *Center for Basic Jewish Studies*, Bar-Ilan University, Ramat Gan, Israel, 2009, www.biu.ac.il/JH/Parasha/eng/vayetze/hagg.html#_ftn3, accessed 19 April 2017.
7. Khouri, R.G., *The Antiquities of the Jordan Rift Valley*, Al Kutba, Amman, Jordan, pp. 114–118, 1988.
8. Wellhausen, J., *Die Composition des Hexateuchs und der Historischen Bücher des Alten Testaments*, 3rd edn, Georg Reimer, Berlin, Germany, p. 13, 1899.
9. La Trobe, J.A., *Scripture Illustrations: Being a series of engravings on steel and wood, illustrative of the geography and topography of the Bible*, L. and G. Seeley, London, UK, p. 11, 1838.
10. MacDonald, B., *East of the Jordan: Territories and sites of the Hebrew Scriptures*, ASOR books vol. 6, Matthews, V. (Ed.), The American Schools of Oriental Research, Boston, MA, p. 59, 2000.
11. Dvorjetski, E., *Leisure, Pleasure and Healing: Spa culture and medicine in ancient eastern Mediterranean*, Brill, Leiden, The Netherlands, p. 170, 2007.
12. Howard, D.M., Sodom and Gomorrah revisited, *J. Evangelical Theological Society* 27(4):385–400, 1984.

13. Conder, C.R., *The Survey of Eastern Palestine: Memoirs of the Topography, Orography, Hydrography, Archaeology, Etc.* vol. 1: *The Adwan Country*, The Committee of the Palestine Exploration Fund, London, UK, p. 147, 1889.
14. Khouri, ref. 7, p. 115.
15. Collins, ref. 4, p. 9.
16. Thomson, W.M., *The Land and the Book: Southern Palestine and Jerusalem*, Harper and Brothers, New York, pp. 371–376, 1882.
17. Tristram, H.B., *The Land of Moab: Travels and discoveries on the east side of the Dead Sea and the Jordan*, Harper and Brothers, Publishers, New York, pp. 346–347, 1873.
18. Josephus, F., *The Wars of the Jews*; in: *The Works of Josephus*, 1987 edn, trans. Whiston, W., Hendrickson Publishers, Peabody, MA, 4:8:452–454, 1736.
19. See, for example, Smith W., *A Dictionary of the Bible*, Zondervan Publishing House, Grand Rapids, MI, p. 768, 1948.
20. Josephus, F., *The Antiquities of the Jews*; in: *The Works of Josephus*, 1987 edn, trans. Whiston, W., Hendrickson Publishers, Peabody, MA, 1:9:171, 1736.
21. Josephus, ref. 18, p. 482.
22. Josephus, ref. 18, p. 686, *fn a*.
23. Josephus, ref. 18, p. 484.
24. Moab and Ammon are part of what is the Hashemite Kingdom of Jordan today, and having been there, I can confirm that this territory is totally desolate.
25. The likelihood of this strip of land being barren is small, because it lies along the river flats where normally the land is green and fertile. There are green fields north of this strip, and also along the river on the opposite side, as we would expect.
26. Fraas, O., *The sulphur of the valley of the Jordan*; in: Warren, C. and Conder, C.R. (Eds.), *The Survey of Western Palestine: Jerusalem*, Committee of the Palestine Exploration Fund, London, UK, pp. 246–248, 1878.
27. For example, Tristram, H.B., *Bible Places: Or, the Topography of the Holy Land*, Gorgias Press LLC, Piscataway, NJ, facsimile reprint of the 1884 edn published by The Gresham Press, Chilworth and London, England, pp. 346–347, 2005.
28. I am doubtful that burning tar fell from the sky, although a survey of commentary on Genesis 19:24 will find various authors who claim this. See Isaiah 34:9, where ‘pitch’ and ‘brimstone’ (sulphur) are two different words used in two different ways within the same verse. The Hebrew word ‘gophriyth’ in Genesis 19:24 is usually translated ‘brimstone’ or ‘sulphur’ (see Strong J., *The Exhaustive Concordance of the Bible*, Abingdon Press, New York, and Nashville, TN, #1614, 1894).
29. Jacobs, A.S., *Remains of the Jews: The Holy Land and Christian Empire in Late Antiquity*, Stanford University Press, Stanford, CA., p. 139, 2004.
30. Bitton, J., Dweck, N., and Fine, S., Yet another Jewish tombstone from late antique Zoar/Zoora: The funerary marker of Hannah daughter of Levi; in: Lundberg, M.J., Fine, S., and Pitard, W.T. (Eds.), *Puzzling Out the Past: Studies in Northwest Semitic Languages and Literatures in Honor of Bruce Zuckerman*, Brill, Leiden, The Netherlands, pp. 7–12, 2012.
31. Kyle, M.G. and Albright, W.F., Results of the archaeological survey of the Ghor in search for the cities of the plain, *Bibliotheca Sacra* 81:276–291, 1924.
32. Politis, K.D., Dealing with the dealers and tomb robbers: the realities of the archaeology of the Ghor es-Safi in Jordan; in: Brodie, N. and Tubb, K.W. (Eds.), *Illicit Antiquities: The theft of culture and the extinction of archaeology*, Routledge, London, UK, and New York, pp. 257–267, 2002; p. 258.
33. Smith W., *A Dictionary of the Bible*, Zondervan Publishing House, Grand Rapids, MI, p. 768, 1948.
34. Vives, L. (Ed.), *Oeuvres Complete de Saint Jerome, Vol. III*, V.P. Larousse et Cie, Paris, France, pp. 483, 501, 1878.
35. Wildberger, H., *Isaiah 13–27: A Continental Commentary*, Fortress Press, Minneapolis, MN, p.137, 1997.
36. Alexander, J.A., *Commentary on Isaiah*, Kregel Classics, Grand Rapids, MI, pp. 316–317, 1992.
37. Morris, J., Have Sodom and Gomorrah been discovered? *Acts & Facts* 42(4): 15, 2013.
38. Wood, B.G., The discovery of the sin cities of Sodom and Gomorrah, *Bible & Spade* 12(3):67–80, 1999.
39. Wood justifies the Bab Edh-Dhra southern location for Sodom by claiming that Lot and Abraham most likely were not at Bethel/Ai when Lot made his choice, but that Abraham and Lot wandered around before their separation. Also, he says that Sodom was not along the Jordan River, but reinterprets what ‘the plain of Jordan’ means. This constitutes bending what Scripture clearly says to fit a chosen location, as there is no indication in Scripture of any of this. See Wood, B.G., *Locating Sodom: A critique of the northern proposal*, *Bible and Spade*, 20(3):78–84, 2007.
40. Austin, S., *Origins: Sodom and Gomorrah*, Part 1, with Dr Steve Austin, Video, Cornerstone Television, Wall, PA, 2010.
41. Unger, M.F., *Archaeology and the Old Testament*, Zondervan Publishing House, Grand Rapids, MI, pp. 114–115, 1954.
42. Sarna, N.M., *Understanding Genesis*, vol. 1 of the *Melton Research Center Series, The Heritage of Biblical Israel*, Jewish Theological Seminary of America, McGraw-Hill Book Company, New York, p. 140, 1966.
43. Rast, W.E. and Schaub, R.T., Survey of the southeastern plain of the Dead Sea, 1973, *Annual of the Department of Antiquities of Jordan* 19:5–53, 1974.
44. Neev, D., and Emery, K.O., *The Destruction of Sodom, Gomorrah, and Jericho: Geological, Climatological, and Archaeological Background*, Oxford University Press, New York, pp. 130–134, 1995.
45. Neev and Emery, ref. 44, p. 62.
46. Sodom and Gomorrah, *Ark Discovery International*, 2014, www.arkdiscovery.com/sodom_&_gomorrah.htm, accessed 19 April 2017.

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Disposal of *Homo naledi* in a possible deathtrap or mass mortality scenario

Timothy L. Clarey

Homo naledi is the most recent claim of a human ancestor. Since its announcement, the question of what the bones truly represent has been under constant scrutiny. The discovering scientists have also proposed that bones were deliberately placed there over an extended period of time by living *Homo naledi* in some sort of burial ritual. However, they did recognize that mass mortality due to a deathtrap is possible.

This paper reviews the detailed geological reports of the cave site. A new disposal interpretation is proposed after recognizing that most of the bone-bearing sedimentary units described in the geological reports could have been deposited simultaneously. The emplacement of *H. naledi* bones can then be explained by a flooding of the cave system, or even a few, closely spaced flood events, which transported suspended sediment and floating remains downward into the Dinaledi and Lesedi Chambers, creating bone beds in each location.

The discovery of an additional 131 bone specimens of *Homo naledi* in a nearby cave within the same cave system seems to reduce the likelihood of deliberate body caching in the Dinaledi Chamber. Instead, the two separate sites suggest *H. naledi* remains were likely transported in by similar processes to both chambers in a deathtrap or mass mortality scenario.

In this interpretation, no body caching over an extended period of time is necessary. The emplacement of *H. naledi* remains may simply represent nothing more than an Ice Age flooding episode of the cave system, revealing very little about past behaviour. Any attempt to humanize these bones by claiming *Homo naledi* had behaviour like humans is unfounded and premature.

Homo *naledi* is the most recent claim of a human ancestor put forth by the secular community. Since the formal announcement in 2015,¹ the question of what the bones truly represent has been under constant scrutiny by secular and creation scientists alike. This paper recognizes the controversial nature of the bone specimens. Some, like Berger, have suggested it is another new ancestor to our own species,¹ while others have claimed it is fully human,² or human with a developmental pathology.³ Still others have claimed it is a possible variety of *Australopithecus sediba*,⁴ and some claim it is a mosaic of different species.⁵ One of the more recent statistical analyses indicates *H. naledi* is most similar to the *Australopithecine* baramin.⁶

Although there is still much debate over whom or what *H. naledi* represents, this paper concentrates on the deposition of *H. naledi* in the Dinaledi Chamber. This topic is very subjective as past behaviours are difficult to glean from a pile of fragmented bones. However, there are sufficient clues to make a reasonable interpretation of how the bones ended up in the Dinaledi Chamber. In geology, there are often two or more explanations for everything we observe. Very little is truly empirical. Although they side with Berger's interpretation that the bones of *H. naledi* were deliberately disposed of over time, Dirks *et al.* have stated, "we recognize that mass mortality of groups of hominins within the Dinaledi Chamber, due to a deathtrap scenario, is possible".⁷ And then

added: "We welcome alternative scenarios that explain the data, but they must explain all the data."⁷

Unfortunately, we all are reliant on limited geological reports. We cannot gain access to the cave and conduct an independent investigation. But Dirks and his co-authors have done a thorough job of describing the geology of the Dinaledi Cave.^{8,9} The proposed interpretation in this paper explains all the relevant geologic data and simplifies the geologic history by recognizing the common origin and timing of two of the sedimentary units described in the published reports of the site.

Review of the geologic setting

The *H. naledi* bones were discovered in the Rising Star cave system in South Africa in 2013. The bones were located in a remote part and extremely hard-to-reach section of the system in a cave called Dinaledi Chamber.¹ To reach this chamber, the scientists had to travel 80 m through two thin passageways, one less than 20 cm high, and through another cave chamber called the Dragon's Back to reach the Dinaledi Chamber⁸ (figure 1). The caves have a capping chert layer that is 1–1.3 m thick and follows the regional dip of the cave system, dipping about 17° to the south-west (figure 1).⁸

The cave system itself has been dated by secular studies elsewhere as Pliocene–Pleistocene (as old as 3 Ma).⁸

However, creation scientists interpret these caves, and most caves, as forming post-Flood, or at the oldest, during the receding water phase of the Flood, making these caves only thousands of years old. Recently published dates of the *H. naledi* fossils show that they are from the later middle Pleistocene, with an absolute age given by the secular scientists of between 236 ka and 335 ka.⁹ This is much younger than originally thought¹ and places the fossils within the climate of the Ice Age.

The skeletal material recovered included 1,550 total bone pieces, claimed to represent at least 15 individuals.⁸ All of the bones were found in the upper 20 cm (8 inches) of cave-filling floor sediment, in what had been identified as Sedimentary Units 2 and 3.⁸ More recently, the definition of these units has changed and all *H. naledi* bones are now identified with a newly described Sedimentary Unit 3b.⁹ These unit designations are discussed below in more detail.

The sedimentary facies, flowstones and sedimentary units

Dirks *et al.* originally defined two sedimentological facies, three sedimentary units, and three flowstones, readily admitting that these stratigraphic interpretations are preliminary and based solely on geological reasoning, including superposition, cross-cutting relations, and mineralogical and textural variations.^{8,9} Because of the lack of direct contact information between all units, the authors refrained from dogmatically defining allostratigraphic units

(which have clear bounding surfaces) and chose to define lithostratigraphic units (defined on the basis of lithologic variations) instead.⁸ Dirks *et al.* did, however, update a few of the sedimentological designations within the chamber in a more recent publication.⁹ For more information on the facies relationships see Dirks *et al.*⁸

Flowstone 1 is composed of five, apparently genetically related, flowstone aprons that project outward from the Dinaledi Chamber below the cave entrance (figure 2).⁸ Dirks *et al.* designated the highest apron as Flowstone 1a, and each subsequently lower apron numbered as Flowstones 1b–1e, respectively, found in descending order 30–100 cm beneath Flowstone 1a. All Flowstone 1 deposits dip about 20–30° toward the bottom of the cave chamber (figure 2).⁸ Some fragments of *H. naledi* bones were found in Unit 3b sediments on the underside of Flowstones 1b–1e (figure 2).⁹ The relationships of Flowstone 2 and Flowstone 3 are shown in figure 2 and described by Dirks *et al.*⁸

Sedimentary Unit 1 is defined by Dirks *et al.* as a laminated orange mudstone found in isolated erosional remnants along the bottom of the Dinaledi Chamber and possibly in some crevasses up to 4 m above the cave floor (figure 2).⁸ Most of Unit 1 is likely buried on the cave chamber floor by Unit 3.⁸ There appears to be a clear age difference defined between Unit 1 and Unit 3 due to superposition and/or cross-cutting relationships.

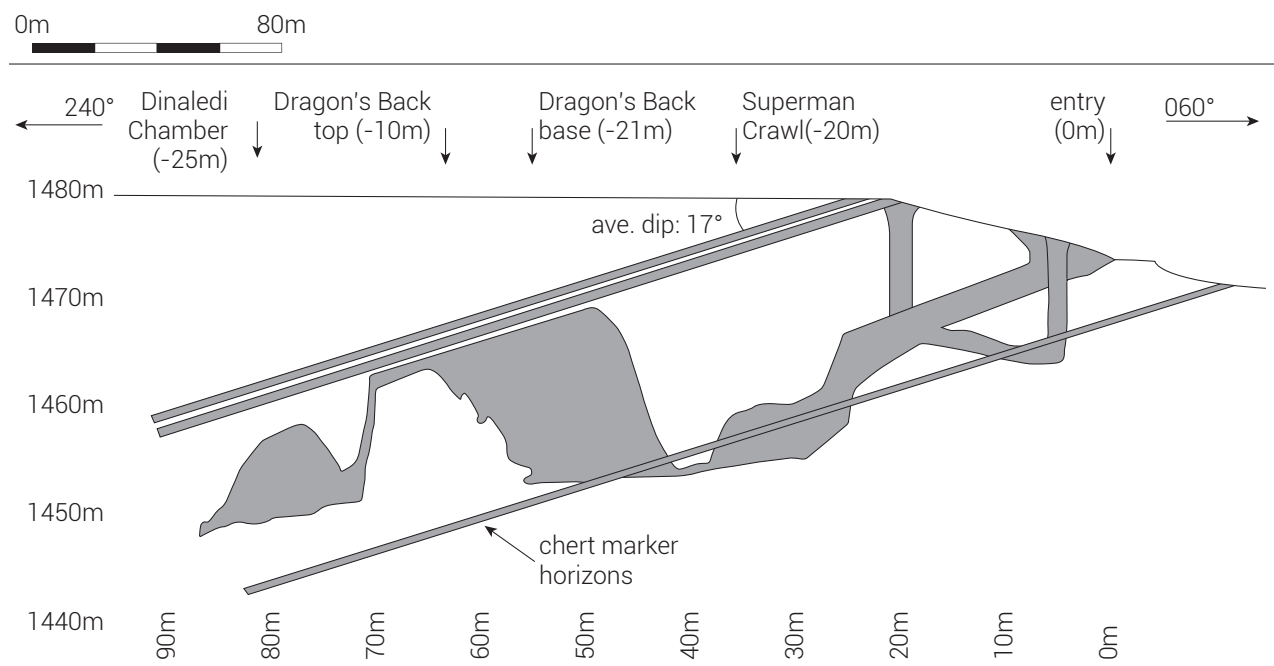


Figure 1. Schematic diagram illustrating the portion of the Rising Star cave system where the remains of *H. naledi* were first discovered. All *H. naledi* fossils in this diagram were found in the Dinaledi Chamber. Modified from Dirks *et al.*⁸ Diagram courtesy of Susan Windsor.

Recently, Dirks *et al.* redefined Sedimentary Unit 2 based on U-Th age-dating of several of the flowstones.⁹ This unit is now identified as “distinctly darker coloured erosional remnants of mud clast breccia under Flowstone 1a”.⁹ Unit 2 no longer includes the remnants under Flowstones 1b–1e because these flowstones were dated much younger than Flowstone 1a.⁹ The remnants attached to Flowstones 1b–1e are now thought to be Unit 3b (figure 2).⁹ The new Unit 2 is described as a “largely lithified mud clast breccia consisting of angular to sub-angular clasts of laminated orange mudstone (similar to that found in Unit 1), embedded in a brown mud matrix”.⁹ Dirks *et al.* noted: “The processes that caused erosion of the Unit 2 debris cone [below the entrance to the chamber] led to the deposition of Unit 3 along the floor of the Dinaledi Chamber ...”.⁹ Unit 2 contains two long-bone macro-fossil remnants, but no *H. naledi* bones.⁹

Sedimentary Unit 3 is claimed by Dirks *et al.* to be the youngest unit, but there are no direct contacts between Unit 2 and Unit 3 (figure 2).⁸ The unit is massive, displaying no layers,⁸ and is “dominated by reworked angular to subangular mud clasts, which are interpreted as being locally derived

from the reworking of Units 1 and 2”.⁹ This unit contains all of the *H. naledi* bones found to date in the Dinaledi Chamber (1,550 bones)⁹ and a few rodent bones.⁸

Dirks *et al.* further stated that:

“Unit 3 sediments are dynamic in the sense that they are poorly lithified in most places [except where attached to the base of Flowstones 1b–1e] and actively slump towards, and erode into, floor drains that occur in parts of the chamber where sediment is being washed down to deeper levels in the cave ...”.⁹

Recently, Dirks *et al.* have split Unit 3 into Unit 3a and 3b on the presence or absence of *H. naledi* bones.⁹ They designated the upper unit as Unit 3b and the lower as Unit 3a (figure 2). Unit 3b is only the upper 20–30 cm and contains all the *H. naledi* bones found in the chamber.⁹ Only a single baboon tooth was found in Unit 3a at a depth of 55–60 cm below the cave floor.⁹ Remnants of Unit 3b, which were originally believed to be Unit 2, are found attached to the base of Flowstones 1b–1e (figure 2).⁹

A few general observations are notable. Unit 1 is separated from Unit 3 by an observable erosional unconformity

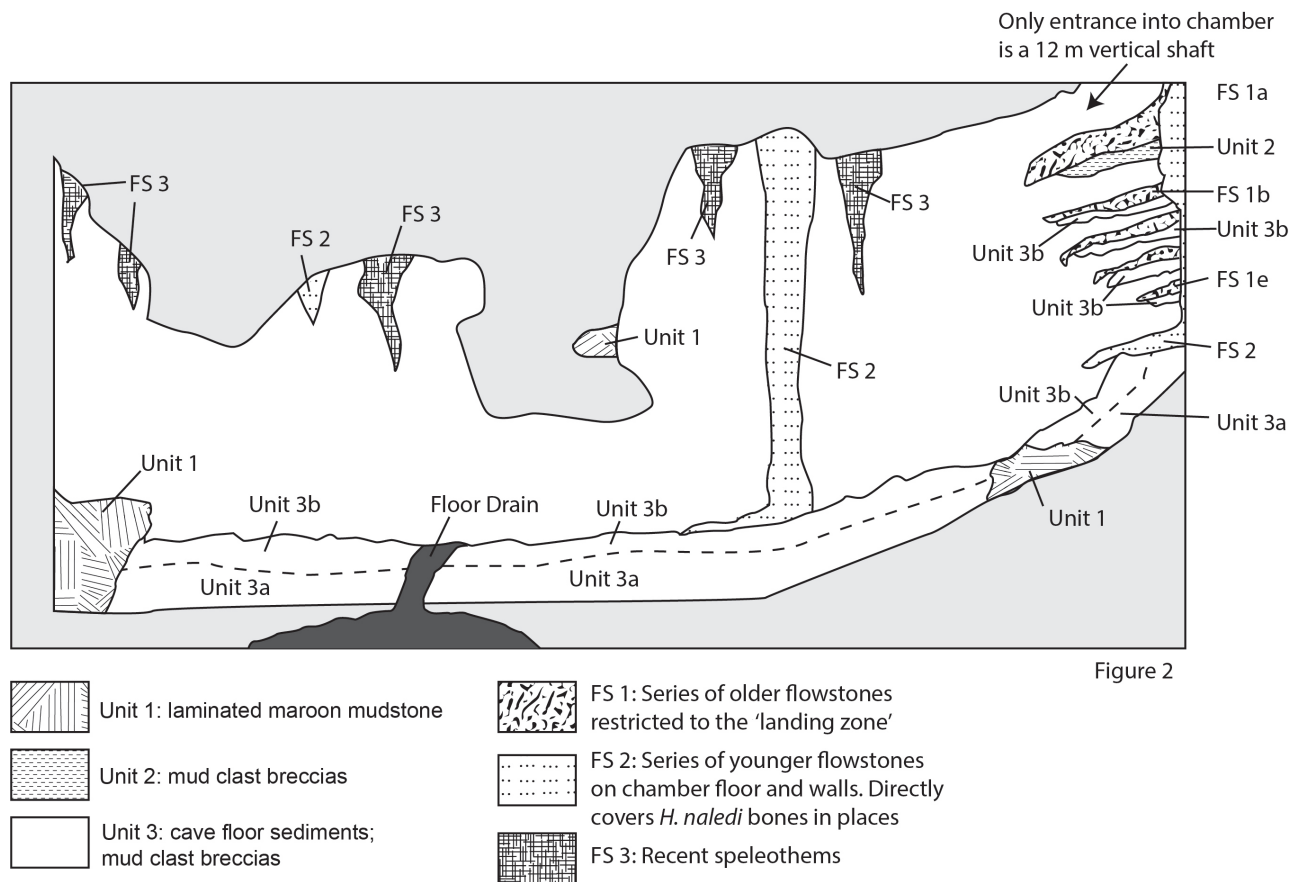


Figure 2

Figure 2. Cartoon diagram of the Dinaledi Chamber illustrating the relationships of the various geologic units as defined by Dirks *et al.*⁸ and modified from Dirks *et al.*⁷ All *H. naledi* bones are found in Units 2 and 3b. Diagram courtesy of Susan Windsor.

contact (figure 2).⁸ And there are no cross-cutting or contact relationships between Unit 2 and Units 3a or 3b. The only difference between Unit 2 and Unit 3 seems to be the darker colour of Unit 2 in its limited, single exposure. In their original paper, Dirks *et al.* described a textural distinction between Unit 2 and Unit 3.⁸ However, the newer designation of Unit 2 lists no obvious textural distinction and it seems merely based on colour and the lack of any *H. naledi* fossils in Unit 2 (figure 2).⁹ As the only exposure of Unit 2 is attached to the base of a flowstone (figure 2), it is difficult to use the degree of lithification as a defining element. All sediments attached to flowstone are better lithified by contact.

Furthermore, the rather abrupt re-designation (from Unit 2 to Unit 3) of the sedimentary remnants attached to the flowstones (1b–1e) is based primarily on age-dating of the flowstones and a few *H. naledi* teeth.⁹ It is not based on observable sedimentary differences and/or textures. See appendix for a more complete discussion on the age-dates at the site.⁹

Two debris cones?

Due to the newly redefined relationships and age-dates, Dirks *et al.* presently postulate that a debris cone composed of Unit 2 sediments formed at the base of the entrance and was eroded and spread across the cave floor. Then, a second debris cone, composed of Unit 3 sediments, developed that was also largely eroded and redistributed across the cave floor at a later time.⁹ This second debris cone (Unit 3) is thought to have contained many of the *H. naledi* bones found in the chamber.⁹

The multiple debris cone scenario outlined by Dirks *et al.*, in part to explain the new age-date relationships, seems rather far-fetched.⁹ Figure 2 shows Flowstones 1a–1e protruding from the wall below the entrance shaft. If Flowstone 1a formed first on top of the Unit 2 debris cone, as shown in their figure 8, how could a subsequent debris cone form underneath? The second debris cone would have had to have gone around Flowstone 1a. It could not have been deposited directly underneath as postulated.

Evidence of fluctuating water levels

There are indications throughout the caves that water levels have fluctuated greatly in the past. Dirks *et al.* reported:

“Throughout the Rising Star cave system erosional remnants of fossiliferous sediment, breccia, and flowstone provide evidence for several cycles of sediment-flowstone fill and removal/dissolution as the level of the water table in the cave changed repeatedly.”⁸

More specifically, they also reported coarse-grained, clastic deposits and channelized sandstone and conglomerate

in the back of the Dragon’s Back Chamber terminating against the Dragon’s Back (figure 1), an indication of high energy flow rates in the preceding up-dip (hydrologically) chamber.⁸ These are pretty strong indications that there was some significant flow that could have spilled down into the ‘burial’ chamber as the Dragon’s Back Chamber filled to the top. Of course only the finer grained muds and any floating remains would have been washed up and over the entrance to the final chamber. If there was yet another chamber down dip, these bones would have likely ended up there.

As this is a cave, occasional flooding by water, not necessarily rapid flowing water, is expected. There was even likely enough water to fill it to the spill point, causing water to flow through the small opening into the Dinaledi Chamber, the last cave in the system and down dip hydrologically (figure 1). Dirks *et al.* reported that the bones were deposited “as older laminated mudstone units [Unit 1] and sediment along the cave floor were eroded”.⁸ Water and suspended material from the Dragon’s Back Chamber could have been transported by flooding of the caves, and the bones too, at flow rates slow enough to float in the body remains and settle out in the Dinaledi Chamber as the water receded (figure 1). High flow rates are not necessary in this scenario.

So, there is ample evidence that the up-dip (hydrologically) chambers (Dragon’s Back) were filled with higher energy flow and there is sufficient evidence that the water level fluctuated throughout the cave system. It should be expected that only the finest clays spilled up and over the Dragon’s Back Chamber and into the lower Dinaledi Chamber (figure 1). Hydrologically, that is the direction of flow.

A second site: Lesedi Chamber

A second site containing *H. naledi* bones has recently been announced from a nearby cave in the Rising Star system called the Lesedi Chamber.¹⁰ This cave is about 60 m NNE (in a straight line) from the Dinaledi Chamber. Hawks *et al.* noted there are four access routes from the surface to this site, but the most direct route drops about 30 m in elevation from the surface opening, with “only one squeeze and no significant crawls”.¹⁰ This chamber also indicates substantial water influence and erosion. Most of the 131 bone fragments found at three sites in the chamber were all elevated above the cave floor and embedded in side fractures and/or dissolution cavities. Some were even sitting on chert shelves nearly a metre above the cave floor. The *H. naledi* specimens, along with some other faunal material, were found in poorly consolidated, mud-clast breccia, similar to the deposits in the Dinaledi Chamber (Unit 3).¹⁰

Hawks *et al.* concluded: “The sedimentary context of the three collection areas [in Lesedi Chamber] is broadly similar, but we have not yet established whether the fossil material

resulted from a single depositional episode or from multiple distinct events.”¹⁰ Their working hypothesis is that the Lesedi Chamber held a much greater volume of sediment that eroded away over time, leaving the bone remnants literally high and dry above the cave floor and embedded in the side fractures and drains.¹⁰

Previous disposal hypotheses

Berger and his team have proposed that the *H. naledi* bones were most likely deliberately placed there by living *Homo naledi* in some sort of burial ritual.^{7,8} As *National Geographic* reported: “Disposal of the dead brings closure for the living and confers respect on the departed, or abets their transition to the next life. Such sentiments are a hallmark of humanity. But *H. naledi*, Berger emphatically stresses, was *not* human.”¹¹ They further suggested that the disposal took place over an extended period of time because they found *H. naledi* bones in both their Unit 2 and Unit 3 sedimentary subdivisions.⁸ This interpretation is reliant on the assumption that Unit 2 and Unit 3 were deposited at separate times.⁸ However, the most recent geological summary has virtually eliminated Unit 2, except one small remnant, and claims instead that all *H. naledi* bones are found only in Unit 3b.⁹

In addition, Dirks *et al.* were unable to fully exclude some sort of mass mortality or deathtrap scenario to explain the *H. naledi* assemblage.⁸ They acknowledged that the deliberate disposal hypothesis was merely their preferred explanation.⁸

However, the long convoluted path to reach these remains makes deliberate disposal of the dead problematic, especially without artificial light, and others disagreed with Berger’s interpretation. Richard Leakey believes they probably washed in, telling *National Geographic*: “There has to be another entrance.”¹¹

Others have also suggested the possibility of an alternative opening to the Dinaledi Chamber. Val has emphasized the difficulty of getting to the Dinaledi Chamber today for small-bodied humans conducting the archaeological investigation, with passages as tight as 20 cm.¹² She pointed out that, despite their small stature, *H. naledi* would have to make a “non-trivial expenditure of effort” to move dead bodies from the surface to a cave chamber located tens of metres underground.¹² And that knowledge of the complex underground cave system would have to be passed on from generation to generation if the disposal took place over an extended period of time. Val instead suggested that there was a past opening through which “bodies or body-parts could have entered the site long after death, introduced by gravity or transported by water from another part of the cave system”.¹²

Val also calculated that the rate of bone survival in the Dinaledi Chamber is only about 10.8% of the total

assemblage, based on the number of claimed individuals.¹² She estimated that there are another 2,757 bones missing, making the assemblage very incomplete and therefore, less likely to be the result of body caching of complete individuals.¹² She further noted that only a limited number of bones found were in fact articulated, contrary to the claim of Dirks *et al.*⁸

Thackeray also argued for another opening to the Dinaledi Chamber, but took a different angle.¹³ He attempted to relate the distribution of spots of black manganese oxy-hydroxide on many of the *Homo naledi* bones to an earlier episode of lichen growth.¹³ He suggested that the bones had to have had a natural light source on them at some point in the past that allowed lichen growth. He concluded that this light source, however subdued, required a second opening to the Dinaledi Chamber.

In their response to Val, Dirks *et al.* pointed out the geological evidence precludes a second opening to the Dinaledi Chamber.⁷ Although they acknowledged the difficulties involved in disposal of bodies in the chamber, they remain committed, based on their sedimentological interpretation, to the deliberate disposal hypothesis for lack of a better explanation.⁷

In a separate response to Thackeray, Randolph-Quinney *et al.* pointed out that many of the bones found in the Dinaledi Chamber have manganese minerals on all sides, not just on a single, light-facing side as would be expected from lichen growth.¹⁴ They explained how dissolved manganese is mediated by microbial action, not lichen growth, and does not require a light source.¹⁴

The most recent arguments over deliberate disposal are a reply by McLain¹⁵ and rebuttal by O’Micks.¹⁶ Both of these papers reiterate similar arguments made above. O’Micks points out the unlikelihood of deliberate, behavioural disposal through the small entrance to the Dinaledi Chamber.¹⁶ On the other hand McLain points out the lack of coarse sediments in the Dinaledi Chamber, the lack of non-hominin macrovertebrate fauna, and lack of abrasion marks on the bones, making high energy transport unlikely.¹⁵ However, McLain never addressed the poor 10.8% recovery of the assemblage in the chamber.

It is rather surprising that McLain uses the lack of visible abrasion on the *H. naledi* bones as an argument for deliberate disposal.¹⁵ Transport by water does not necessitate abrasion. Most dinosaur bones show little effects of abrasion, even though they were deposited rapidly in catastrophic conditions. Dinosaurs were commonly ripped apart, many with the skin and flesh attached, prior to burial in deposits of thousands of bones. Why should *H. naledi* be different?

The second discovery of *H. naledi* specimens in a nearby, but separated, chamber also adds to the disposal mystery.¹⁰ Now, at least two separate sites in adjacent parts of the same

cave system contain multiple *H. naledi* specimens and have to be explained. The Lesedi Chamber contains 131 bone pieces from at least three individuals, including two adults and a juvenile.^{10,12}

The two discoveries make it less likely that the *H. naledi* remains in the Dinaledi Chamber were deliberately cached. Why deliberately cache bodies in the Dinaledi Chamber, with its tortuous and narrow passages that take two hours to traverse,¹⁶ if other *H. naledi* were being disposed of elsewhere, nearly simultaneously and in the same system, and yet was easier to reach? And it is possible that new chambers with more bones of *H. naledi* will be found within the cave system in the future.

Possible solution to *H. naledi* disposal

It seems improbable, based on the observable geology of the Dinaledi Chamber, that there was another opening to the cave for the *H. naledi* bones to have entered. Therefore, it seems the only entrance point was the small opening at the back of the Dragon's Back Chamber (figure 1). However, there may still be another solution that explains all the observable physical relationships. This new model places little credibility in the wide ranges of reported age-dates, other than to use them in a relative sense (see appendix).

Similarities between the Dinaledi and Lesedi Chambers

There are several similarities between the Dinaledi and the Lesedi Chambers that must be explained by any disposal model. First, there is the consistent geology of the cave floor and the pattern of bone fragmentation in both the Dinaledi and Lesedi Chambers.^{9,10} Second, there is the incomplete percentage of recovery in each of the assemblages, although the Lesedi Chamber recovery is admittedly higher.^{8,10} Third, the bones in each chamber are more than likely the same age, although this remains unconfirmed at present. Finally, both chambers seem to have developed in 'bottlenecks' in the Rising Star cave system, where traps for bones would likely collect by natural transport processes down gradient from the surface opening (figure 1).¹⁰

Only one debris cone?

Based on the geologic descriptions, it appears that Sedimentary Units 2 and 3 are very similar texturally and mineralogically and therefore can be assumed to be the same unit.⁹ This assumption is warranted because Dirks *et al.* rather abruptly changed the designation of most of the original Unit 2 to Unit 3 from one paper to the next, based solely on age-date results, not on the geological description.^{8,9}

That would suggest that Unit 2 and most of Unit 3b were deposited nearly simultaneously as one event, contrary to

the age-date data.⁹ Dirks *et al.* make the assumption that these units were deposited at separate times, and they even assume that there were separate debris piles for their Units 2 and 3.⁹ But they do so without direct and observable contact relationships.^{8,9} They readily admit they "do not yet have a clear understanding of the age relationships, nature of disconformable surfaces, or the extent of reworking between units".⁸ In their discussion section, Dirks *et al.* stated: "Whereas Unit 1, is a distinct older stratigraphic unit, Units 2 and 3 appear to have formed in a continual manner involving the interaction of three separate processes."⁸

If Units 2 and 3b were deposited simultaneously, then only one debris pile would have been necessary to build up below the entrance of the Dinaledi Chamber, eliminating the need for the creation and erosion of two complete debris cones. This model requires no second debris pile to mysteriously accumulate under the 'umbrella' of Flowstone 1a (figure 2).

Any sediment entering the chamber from a single opening would likely experience a drop in velocity as water moved from the constricted, narrow tube-like opening at the rear of Dragon's Back and into a widened chamber (figure 1). This drop in velocity would deposit a coarser fraction and spread a finer fraction across the bulk of the chamber, similar to an alluvial fan or a delta deposit. It is simple gravity-driven flow of sediment from the source area, beneath the chamber opening, toward the rear of the chamber, fining in the direction of transport.

Therefore, Unit 2 may be simply the uppermost remnant of the original debris cone that was deposited at the base of the chamber entrance as the bone-rich material was deposited within the Dinaledi Chamber. Unit 3a is possibly the earlier chamber deposits that were emplaced before the debris cone (figure 3). Most of the bones were likely originally deposited in the debris pile beneath the chamber opening by a completely flooded Dragon's Back Chamber, spilling downward into the Dinaledi Chamber. It was not until later, during the progressive erosion of the debris cone, that the bulk of the bones became dispersed across the top of the cave floor as Unit 3b (figure 3). In this scenario, there is no need for two separate debris cones as postulated by Dirks *et al.*⁹

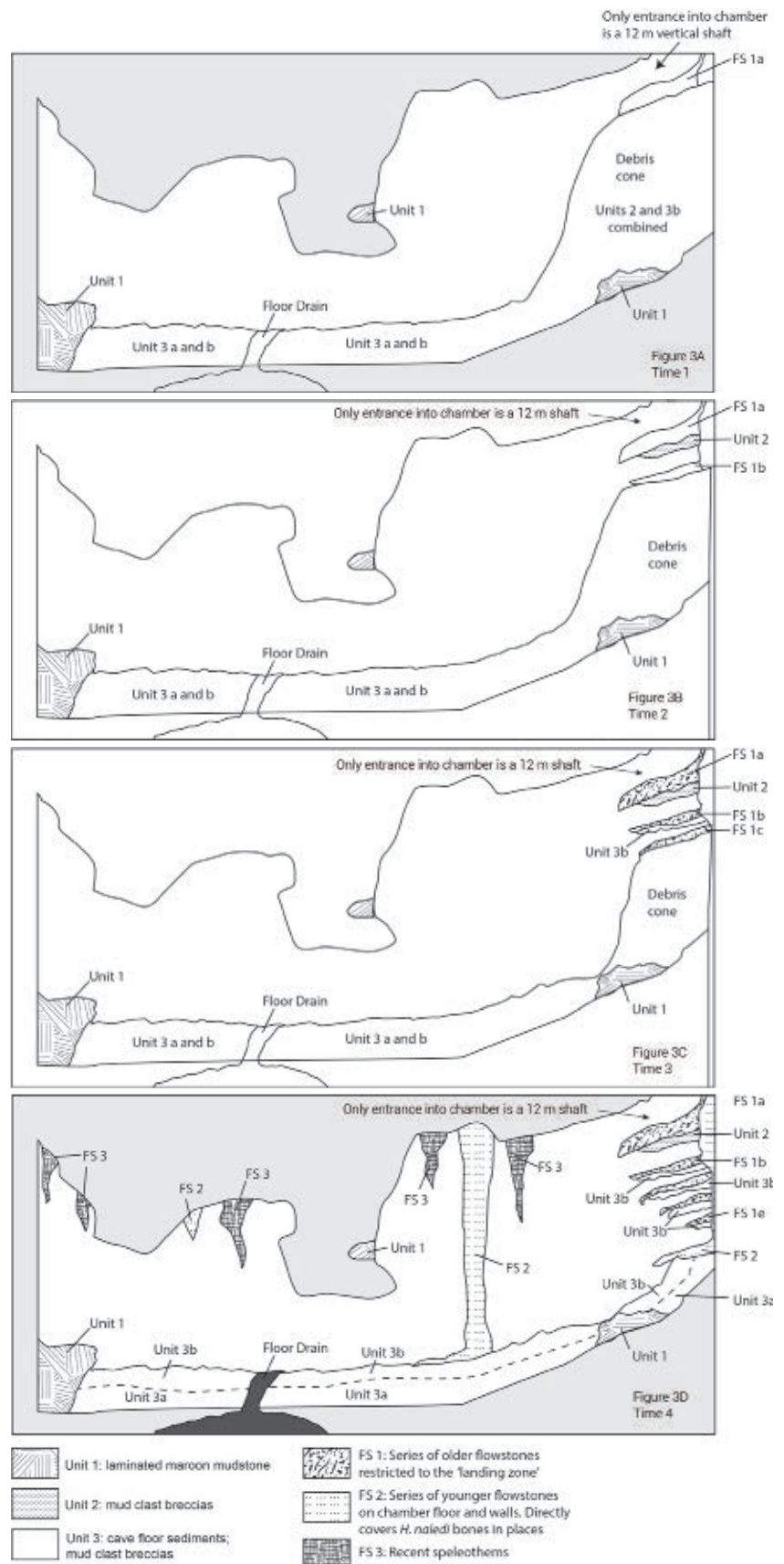
Dirks *et al.* further described their interpretation for the progressive erosion of most of the debris cone near the Dinaledi Chamber entrance, due to creep and slow removal of sediment toward floor drains.⁷ Between each subsequent period of erosion, a new flowstone cap formed on top the debris cone (figure 3). This is illustrated by Flowstones 1a–1e which retained small amounts of sediment on its undersides. It is only the debris cone which was progressively reworked and spread on top of the earlier cave floor deposit (figure 3).

Could water accomplish the disposal of bones in both chambers?

In their defence, Dirks *et al.* concluded that direct flow of sediment-laden water could not travel from the Dragon's Back Chamber into the Dinaledi Chamber (figure 1).⁷ "The Dragon's Back Chamber is the deepest part of the cave in which sediment from the surface can accumulate by gravitational means through the flow of water along the cave floor."⁷ However, their conclusion only considered water flow along the bottom of the cave system, not suspended, mud-rich sediments and floating *H. naledi* remains. It is only the suspended material (clay-rich faction and floating partial remains) that seems to have made it through the tight opening and into the Dinaledi Chamber. All the coarser, sand-rich deposits were left at the base of the Dragon's Back Chamber.⁷

Both of these bone chamber deposits likely occurred in the Ice Age, a time when the climate was likely experiencing more rainfall from the effects of the recent global Flood. It is therefore possible that flash-flooding of the Dragon's Back Chamber transported either previously deceased or *H. naledi* taking refuge in the cave entrance, ultimately dismembering the bodies and floating the partial remains to the Dinaledi and Lesedi Chambers of the cave system (figure 4). Alternatively, the *H. naledi* may have died elsewhere and were washed into the cave system and then to both chambers. Recall, Dirks and his

Figure 3. Cartoon of the Dinaledi Chamber illustrating the deposition of the *H. naledi* bone bed from one debris cone composed of Units 2 and 3b and subsequent step-by-step (A-D) erosion of the debris cone and deposition of later flowstones. The debris cone and Units 2 and 3b are assumed to have been deposited simultaneously. The separation of Unit 2 and Unit 3b only occurred as the debris cone diminished in size. Diagrams courtesy of Susan Windsor.



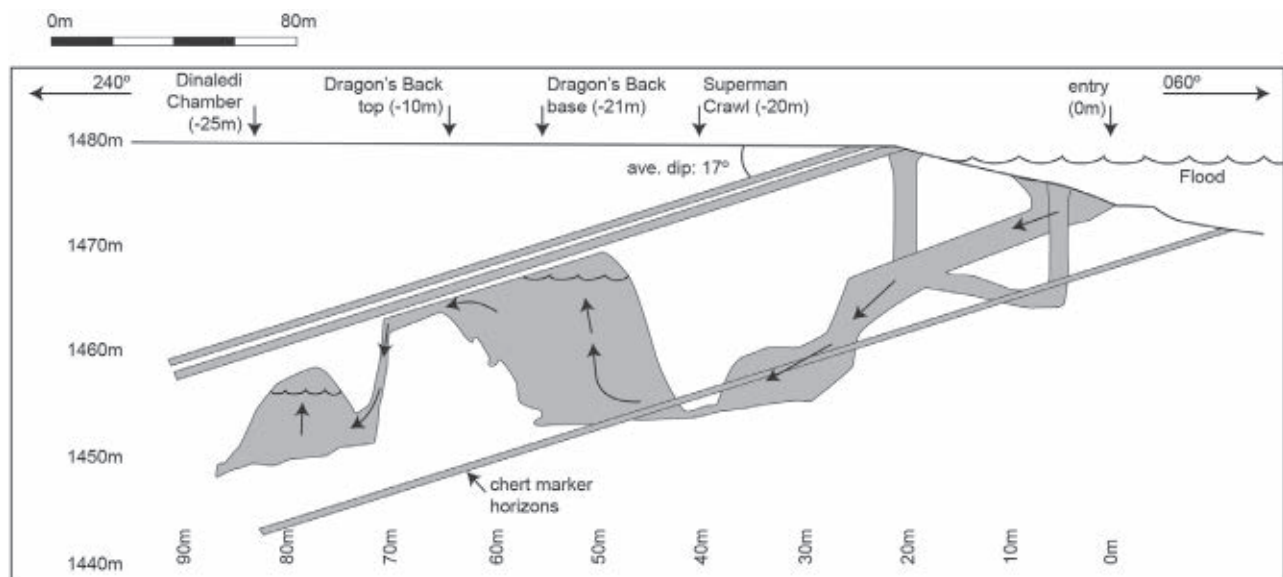


Figure 4A

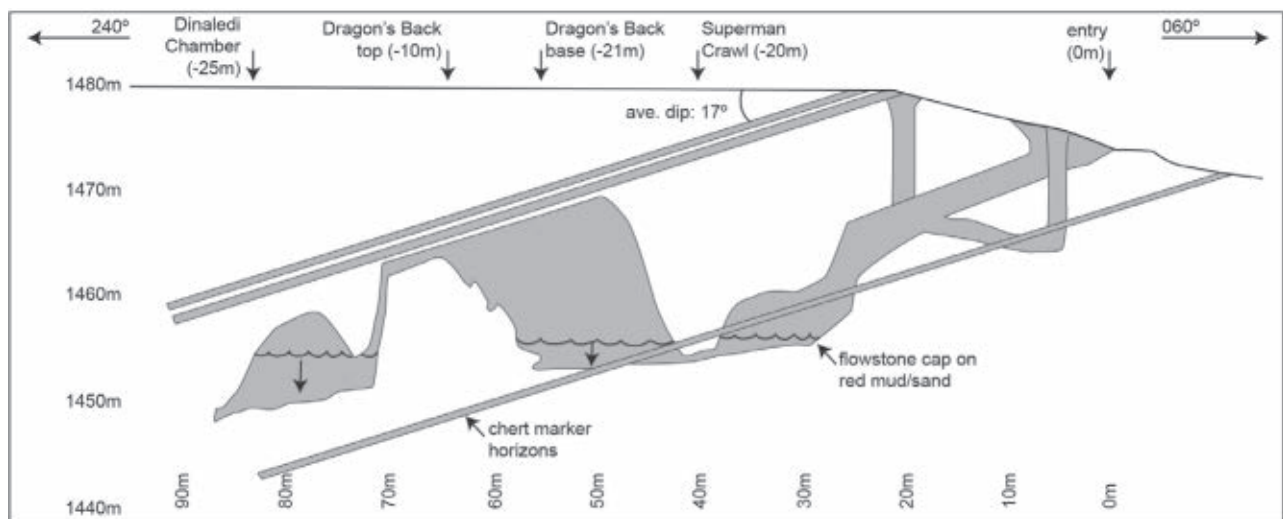


Figure 4B

Figure 4. Cave system flood model for the deposition of *H. naledi* in the Dinaledi Chamber. Arrows show the direction of water movement. **A.** Water flooding the Dragon's Back Chamber begins to spill over into the Dinaledi Chamber transporting the floating remains of *H. naledi*. **B.** Receding water phase and deposition of the *H. naledi* remains in the debris cone and along the floor of the Dinaledi Chamber. Diagrams courtesy of Susan Windsor.

colleagues have previously described ample sedimentary evidence in the Dinaledi Chamber that suggests periods of higher water flow rates.⁷

In this scenario, only one depositional episode is necessary. Hydrologically, the direction of flow is down dip and into the lowermost chamber (figure 4). As the flooding subsided, the *H. naledi* remains would likely have piled up below the Dinaledi Chamber opening (Unit 2 and 3), and later erosion spread the bones across the entire floor of the chamber in a haphazard arrangement (Unit 3b).⁷

Finally, if the *H. naledi* were human as some have claimed,² why would they not bury their dead in orderly graves? Why just toss them into the back chamber of a cave system that is so difficult to access? Most ancient cultures buried their dead in a deliberate ritualistic manner involving clothing and/or possessions.^{16,17} The *H. naledi* bones reflect no order or pattern. They are randomly distributed and very incomplete assemblages, more typical of the settling of floating partial remains as a flood subsided and/or redistributed after disposal in a debris pile.

Conclusion

The *H. naledi* bones can be explained by a single episode (or possibly closely spaced episodes) of flooding of the Rising Star cave system, causing the spill of suspended sediments and *H. naledi* remains to drain down dip, hydrologically, into the Dinaledi and Lesedi Chambers. By combining Units 2 and 3b and recognizing that there was likely only one debris cone in the Dinaledi Chamber, a simplified water-aided disposal interpretation is possible.

Any attempt to humanize these bones by claiming *Homo naledi* had behaviour like humans is unfounded. To the contrary, this paper suggests a scenario where no body caching over an extended period of time was necessary. As creation scientists, we are compelled to honour all the factual data, but we must be careful not to interpret geological data in the secular worldview or to readily accept secular interpretations without critical review, especially the age-dates as described in the appendix.

The emplacement of *H. naledi* in the Dinaledi and Lesedi Chambers may be nothing more than the consequences of extreme Ice Age climate fluctuations and occasional flash flooding events. This scenario fits the Creation model envisioned for the post-Flood world.

Appendix

The Age-Dating Game

Although a full analysis of the age determination results of *H. naledi* is beyond the scope of this paper, a brief discussion is very revealing.⁹ Table 1 shows the range of ages for selected samples and for the various techniques that were applied to date the actual fossils of *H. naledi*. The values to create this table were extracted from Dirks *et al.*⁹ Only the ranges of the values are listed, ignoring the uncertainties to simplify the chart. Refer to Dirks *et al.* for the details and proper uncertainties.⁹

Dirks *et al.* sampled three *H. naledi* teeth (samples 1767, 1788, and 1810) and employed electron spin resonance (ESR) and U-Th methods to date them. Note in table 1 that the ESR method came up with dates that are considerably older for all three teeth, in some cases nearly double the age of the U-Th method.

Also, ¹⁴C dating was used on three bone fragments of *H. naledi*. The ¹⁴C dates were determined to be between 33 and 35.5 ka,

much closer to the U-Th results for the three *H. naledi* teeth than the ESR results (table 1). Dirks *et al.* claimed that these ¹⁴C dates were contaminated by calcite precipitation in the cones, and therefore unreliable.⁹ Although they measured the $\delta^{13}\text{C}$ relative to PDB-1, they did not report the value in their paper. The ¹³C/¹²C ratio can be quite diagnostic in animal bone and would have been a good test of the degree of calcite alteration, if any, as many bones acquire ¹³C in a distinctly different ratio compared to the ¹³C/¹²C ratio of local ground water.¹⁸

Examining just the results of *H. naledi* bones that were tested reveals an interesting story. Table 1 shows U-Th dates for the three samples of *H. naledi* teeth to vary from 43.5–146.8 ka, with the majority of the age values falling less than 100 ka.⁹ The ESR values for the same three *H. naledi* teeth show values ranging from 87–284 ka, with each tooth showing a remarkably different range in ages.⁹ And finally, the ¹⁴C dates for the *H. naledi* bone fragments also are less than 100 ka.⁹

So, how did Dirks *et al.* determine that the *H. naledi* bones were deposited between 236–335 ka?⁹ They used the older ESR results from the teeth and the U-Th ages from the various flowstones.⁹ They apparently disregarded the U-Th results for the *H. naledi* teeth as they were too young.

Table 1. Range of age determinations by method for three *H. naledi* teeth and three unidentified bone fragments, from Dirks *et al.*⁹ All values in 1,000s of years (ka). Uncertainties were omitted for clarity. ESR=electron spin resonance, AMS=accelerated mass spectrometry.

<i>H. naledi</i> Teeth Sample Numbers				
Dating Method	#1767	#1788	#1810	Bone Pieces
C-14 (AMS)	-----	-----	-----	33–35.5
ESR	87–104	194–247	230–284	-----
U-Th	43.5–46.1	58.9–75.1	66.2–146.8	-----

Table 2. Range of age determinations by method for selected flowstones in the Dinaledi Chamber, from Dirks *et al.*⁹ All values in 1,000s of years (ka). Uncertainties were omitted for clarity. OSL=optically stimulated luminescence, MAM= minimum age model allied to OSL method, CAM=central age model applied to OSL method. CAM was considered unrealistic by Dirks *et al.*⁹ See figure 2 for locations of flowstones.

Flowstones					
Dating Method	FS1a	FS1b	FS1c	FS2	FS3
U-Th	478–502	290	50–242	24–106	9–10
OSL (MAM)	353	231–241	-----	-----	-----
OSL (CAM)	849	546–560	-----	-----	-----

Table 2 shows a summary of the flowstone U-Th dates for various flowstone samples as illustrated in figure 2. Dirks *et al.* reported that Flowstone 1a, the top flowstone in figure 2, was between 478–502 ka, and Flowstone 1b at 290 ka, and Flowstone 1c at 50–106 ka, with one other sample from Flowstone 1c dated at 242 ka. They used the means of these flowstone dates, ESR results for only two of the three teeth samples (1788 and 1810, the oldest dates) and the one baboon tooth buried in sediment below the *H. naledi* bone bed, in Unit 3a, to come up with the minimum and maximum age designation for *H. naledi*.⁹

The ages of the bones themselves, however, show a much younger range of ages (table 1). It seems a bit odd that Dirks *et al.* selectively chose to disregard so much of the actual bone information and most of the dating results that revealed younger ages.⁹ They seemed to arbitrarily have picked older values out of these data sets to arrive at an age that was as old as possible. Recall, it was the reliance on the new flowstone dates that made them alter their original stratigraphy.⁹ Stratigraphic details and geologic relationships should be viewed as more factual compared to age-dates, and yet, age-dates seem to always trump any other data sets, regardless of conflicts. The now defunct older stratigraphic definitions of the sediments in the Dinaledi Chamber are merely collateral damage.

References

- Berger, L.R., *et al.*, *Homo naledi*, a new species of the genus *Homo* from the Dinaledi Chamber, South Africa, *eLife* 2015;4:e09560:1-35 | doi:10.7554/eLife.09560, 2015.
- Wood, T.C., An evaluation of *Homo naledi* and ‘early’ *Homo* from a young-age creationist perspective, *J. Creation Theology and Science Series B: Life Sciences* 6: 14–30, 2016.
- Line, P., The mysterious Rising Star fossils, *J. Creation* 30(3):88–96, 2016.
- O’Micks, J., *Homo naledi* probably not part of the human holobaramin based on baraminic re-analysis including postcranial evidence, *Answers Research J.* 9: 263–272, 2016.
- Clarey, T., *Homo naledi*: geology of a claimed missing link, icr.org/article/homo-naledi-geology-claimed-missing, posted 15 October 2015.
- O’Micks, J. in press, Further evidence that *Homo naledi* is not a member of the human holobaramin based on measurements of vertebrae and ribs, *Answers Research J.*
- Dirks, P.H.G.M., *et al.*, Comment on “Deliberate body disposal by hominins in the Dinaledi Chamber, Cradle of Humankind, South Africa?” [*J. Hum. Evol.* 96: 145–148, 2016], *J. Human Evolution* 96:149–153, 2016.
- Dirks, P.H.G.M. *et al.*, Geological and taphonomic context for the hominin species *Homo naledi* from the Dinaledi Chamber, South Africa, *eLife* 2015;4:e09561:1-37 | doi:10.7554/eLife.09561.
- Dirks, P.H.G.M. *et al.*, The age of *Homo naledi* and associated sediments in the Rising Star cave, South Africa. *eLife* 2017;6:e24231 | doi:10.7554/eLife.24231.
- Hawks, J., *et al.*, New fossil remains of *Homo naledi* from the Lesedi Chamber, South Africa, *eLife* 2017;6:e24232 | doi:10.7554/eLife.24232.
- Shreeve, J., Mystery man: A trove of fossils found deep in a South African cave adds a baffling new branch to the human family tree, *National Geographic* 228(4): 30–57, 2015.
- Val, A., Deliberate body disposal by hominins in the Dinaledi Chamber, Cradle of Humankind, South Africa? *J. Human Evolution* 96:145–148, 2016.
- Thackeray, J.F., The possibility of lichen growth on bones of *Homo naledi*: were they exposed to light? *South African J. Science* 112(7/8):1–5, 2016.
- Randolph-Quinney, P.S. *et al.*, Response to Thackeray (2016)—The possibility of lichen growth on bones of *Homo naledi*: were they exposed to light? *South African J. Science* 112(9/10):1–5, 2016.
- McLain, M., Reply to O’Micks concerning the geology and taphonomy of the *Homo naledi* site, *Answers Research J.* 10:55–56, 2017.
- O’Micks, J., Rebuttal to “Reply to O’Micks concerning the geology and taphonomy of the *Homo naledi* site” and “Identifying humans in the fossil record: A further response to O’Micks,” *Answers Research J.* 10:63–70, 2017.
- Callaway, E., Ancient genome delivers ‘Spirit Cave Mummy’ to US tribe, *Nature* 540(7632):178–179, 2016.
- Hoefs, J., *Stable Isotope Geochemistry*, 3rd edn, Springer-Verlag, Berlin, Germany, 1987.

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Sodom—part 2

Anne Habermehl

According to Scripture, Sodom was destroyed at the time of Abraham about 1900 BC on the biblical timeline. In this paper it is argued that the standard secular timeline diverges drastically from the biblical timeline in this era, and that the destruction of the cities of the land of Sodom would have been near the beginning of the Early Bronze Age (3000 BC or possibly earlier). Archaeologists therefore need to look for these cities much earlier on the secular timeline than is commonly believed. In this second installment on Sodom, we look at some implications of placing Sodom's destruction this early in secular history. Arguments are also presented against Tall el-Hammam as Sodom.

No matter how good the arguments appear to be for locating the cities of Sodom in any given place, the ruins must date correctly. Otherwise, that location will be rejected. It is therefore necessary to determine what the 'correct' date for Sodom's destruction should be. We know that this event occurred when Abraham was 99 years old, a year before Isaac's birth (see Genesis 17:24 and 21:5). On the biblical timeline, this would be about bc 1900 BC.¹ The question is when this was on the secular standard timeline that is used by historians in the world at large.

Divergence of the biblical and secular timelines

The secular world has its own timeline and its own methods of dating, that differ from the biblical ones. If we think about it, there is no reason why the biblical and secular timelines of history should coincide because they were developed in two very different ways. The biblical timeline back to creation was developed by narrative inspired by God. The secular timeline was developed by putting together Egyptian and prehistoric events back to evolution's big bang. Ultimately, when we go back far enough, this divergence of the two timelines is spectacular: the beginning of everything is less than 10,000 years ago on the biblical timeline, and is nearly 14 billion years ago on the secular timeline.²

The implications of this divergence of the biblical and secular timelines are enormous. It is the cause of much confusion in biblical archaeology, and leads to charges by secular historians that the biblical narratives are not true. I submit that if we do not understand how much the biblical and secular timelines diverge at the time of Abraham, we will not recognize the ruins of Sodom, even if they are sitting right under our noses.

Dating of Sodom's destruction on the secular timeline

For arguments supporting the destruction of Sodom at the time of Abraham at around 3000 BC (secular), or even earlier, see appendix below. These arguments are based on

showing first, that Joseph had to have been the same person as Imhotep of Egyptian history, and then calculating how long Abraham would have lived before Joseph.

The placement of Abraham at the end of Early Bronze I is not a new idea to the readers of the *J. Creation*. Osgood³ argued in a 1986 (*TJ*) article that Abraham had to have lived at least a thousand years earlier on the secular timeline. His thesis was based on well-argued archaeological data. What is interesting is that we have arrived at essentially the same place on the Egyptian timeline by two quite different means of looking at the subject.

This divergence of the two timelines is a large subject that cannot be covered here. However, we point out that the amount of divergence varies throughout ancient history. For instance, at the time of the Exodus the difference between the two timelines would have been about 350 years.⁴

Era of the destruction of the country of Sodom

In ancient times in the Near East, lands were organized into city states. Cities controlled the territory immediately around them; on this surrounding land were unwallled villages, grazing animals, and growing crops. The whole lot constituted the city state, with a ruler over it. It was also not unusual for the king of one city to be the ruler over other nearby vassal cities.^{5,6} It appears that the territory occupied by the cities of the plain was organized somewhat along these lines. According to Josephus,⁷ five kings managed the affairs of the country of Sodom. In his description of the Dead Sea, he says that "the country of Sodom borders upon it".⁸ He therefore distinguishes between the city and country of Sodom. From the biblical references to the cities, it would appear that the king of Sodom was the chief ruler over the others; this would be in keeping with his first mention in Genesis 14:2, and with the name of the kingdom having the same name as the city of Sodom. We see, in addition, that it is the king of Sodom who negotiates with Abraham over the "persons and the goods" (Genesis 14:21–24) after the recovery of these from the united kings of Mesopotamia. As a side note, Garfinkle⁹ emphasizes that the availability

of people for labour was important in these early city states. In this the king of Sodom was consistent, because he wanted his people back, and never mind the loot.

There are indicators that the cities of the plain must have existed for an unknown period of time before their destruction. For one thing, there is the developed cohesive governing unit of the land of Sodom. Also the wickedness of the cities had clearly gone on for some time to have developed to a point that they were singled out for destruction by the Lord. The country of Sodom may well have existed even earlier than the Early Bronze Age, in what is called the Chalcolithic era.¹⁰

Historical level of the Dead Sea

If we put the time of the cities' destruction at around 3000 BC (secular) or earlier, the elevation of the Dead Sea was about 370 m below sea level, 55 m higher than it is today (see figure 1 for historical variations in the level of the Dead Sea on the secular timeline). The Dead Sea stayed high for over a thousand years on this timeline. After its level fell around 2000 BC (secular), it did not rise that high again. For those who apply the biblical timeline date of 1900 BC for the destruction of Sodom, the graph in figure 1 shows that the Dead Sea level was still as high as at any later time.

This high level of the Dead Sea at the time of the cities' destruction has obvious implications for claims by some that the remains of the cities were under the southern end of the Dead Sea (as discussed in part 1). The cities cannot have ever been under water because at the time of the cities' destruction, the Dead Sea was at its highest level in

historical times. This high level is also implicated in the next section on the Vale of Siddim.

Sodom and the Vale of Siddim

In an earlier incident, before the destruction of the cities, the united kings of northern Mesopotamia¹² defeated the Amorites¹³ in the hills of En Gedi, and then appeared to be headed for Sodom next (Genesis 14:5–8). Certainly the five kings of the country of Sodom thought so, because they went out to meet their enemy, and joined battle in the Vale of Siddim, the same place where they had made an agreement 14 years earlier (Genesis 14:3–8). This means that Sodom was not located in this Vale of Siddim, as some sources state; for example, Easton¹⁴ incorrectly defines Sodom as “a city in the Vale of Siddim” in his well-known dictionary. The progression of the Mesopotamian army campaign would seem to indicate that this valley was located somewhere between the En Gedi hills area on the west of the Dead Sea and Sodom at the north end of the Dead Sea.

The Vale (or Valley) of Siddim is called the Salt Sea in the KJV and NIV (Genesis 14:3). This has rather confused the issue, because the Dead Sea is also called the Salt Sea (for example, later on in Joshua 15:5). However Genesis 14:8 says that this battle was fought *in* this Vale of Siddim, and obviously nobody is claiming that the armies fought under water. An explanation often offered is that this valley was later filled in by the Dead Sea, which rose over time.^{15,16} The problem with this explanation is that the Dead Sea was quite a bit higher back then (on either timeline), as we have shown above. We note that in addition to its

usual meaning as a body of water, the Hebrew word ‘sea’ can have varied meanings, including ‘basin’, according to Strong.¹⁷ Therefore it is possible that the meaning of ‘basin of salt’ is intended for the Valley of Siddim.

Some would look for tar to locate this Vale of Siddim, because the kings of Sodom and Gomorrah fell into slime pits there (Genesis 14:10). However, there is oil shale throughout Israel, as shown in a US Geological Survey Scientific Investigations Report.¹⁸ Four thousand years ago there could have been oil seeps in many places.

What about Jericho? A tale of power politics

As we have seen, Jericho would have been only a couple of miles from

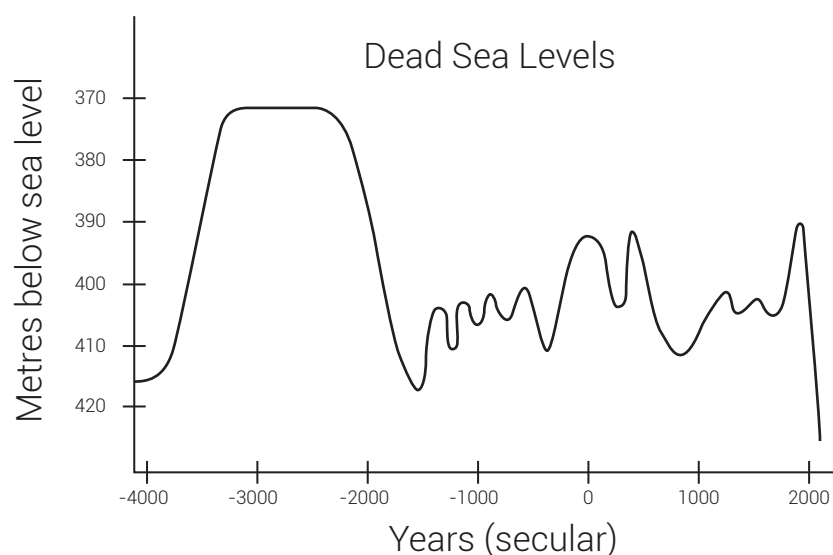


Figure 1. Graph of historical levels of the Dead Sea. In 3000 BC (secular timeline), at the time of the destruction of the land of Sodom, the level of the Dead Sea was about 55 m higher than it is today. (After Enzel *et al.*¹¹).

Sodom and Gomorrah and Zoar. Why did Jericho not figure in the story of the destruction? Why did Lot not take shelter there when he left Zoar? Why did Lot's daughters think that there were no men available for them (Genesis 19:31)?

According to secular archaeologists, Jericho was essentially uninhabited for hundreds of years in the period before 3000 BC.¹⁹ The often-stated claims that Jericho is the oldest continuously inhabited city on Earth are not totally true.²⁰ We suggest here that Jericho would have been uninhabited at the time of the destruction of the cities and that this explains why Jericho was not mentioned in the biblical story. Sodom may even have earlier destroyed Jericho because it was an enemy or posed a power threat. (Of course, we might wonder why Sodom did not merely conquer Jericho and include it as one of the cities of the plain.) In any case, the Sodom kingdom must have exerted considerable power in the area before its destruction, because it was in the crosshairs of the coalition of the four kings of northern Mesopotamia, as described in Genesis 14.

Jericho was reoccupied at the beginning of the Early Bronze Age II.^{21,22} We might expect this, because the sudden demise of the nearby land of Sodom would have produced an instant power vacuum in the area. At this time extensive defensive walls were built of mud brick of an unusual sand dune yellow colour.²³ Of all the walled levels of Jericho, only this set of walls is made of yellow brick like this. Whether or not this yellow colour is due to large quantities of sulphur in the mud brick is not mentioned in the literature, and we can only speculate on this.

It needs to be pointed out that the secular history of Jericho's occupation is totally separate from the arguments that place Abraham and the destruction of Sodom at around 3000 BC. The two matters are independent, but they support each other.

Was the destruction due to a natural geologic event?

The Bible says that "the Lord rained upon Sodom and upon Gomorrah brimstone and fire from the Lord out of heaven" (Genesis 19:24). This could be taken to mean that the destruction was a purely supernatural event.

Whether it was a miracle, or whether it was also a natural geological event, is a matter of discussion among scholars. Some form of earthquake is a favourite. For instance, geologist Austin claims that it was

an earthquake,²⁴ as do geologists Neev and Emery²⁵. Professor of Biblical Studies Sarna²⁶ tells us that "we are most likely, then, dealing with a description of one of the last earthquakes that shaped the lower Jordan Valley area the earthquake was accompanied by lightning which ignited the natural gases and seepages of bitumen or asphalt ... causing a terrible conflagration." Geographer George Adam Smith²⁷ prefers an explanation that describes gas discharged by underground pressure or earthquake: "the gas explodes, carrying high into the air masses of oil which fall back in fiery rain" Gnanaraj²⁸ surveys a number of ideas and chooses a massive sudden earthquake with lightning, and ignition of natural gases and asphalt.

Geological events certainly could have occurred north of the Dead Sea at the time of the destruction. There is a fault line that starts at the Dead Sea on the west side of the Jordan, and crosses over to the east side somewhat north of Jericho. As figure 2 shows, the cities would have been sitting practically on top of this fault.

Scripture goes on to say that "he overthrew those cities, and all the plain, and all the inhabitants of the cities, and that which grew upon the ground" (Genesis 19:25). This could be taken to indicate an earthquake that literally overthrew the cities. However, 'overthrow' does not necessarily mean a literal knocking over, and cannot be used to claim that an earthquake had to have taken place. This same word is used in other places in the Bible where the overthrowing is not literal. See, for example: "I will overthrow the throne of kingdoms" (Haggai 2:22); "I will overthrow the chariots" (Haggai 2:22); "it (the land) as overthrown by strangers" (Isaiah 1:7); and, "the wicked are overthrown" (Proverbs 12:7).

Whatever kind of event it was, the destruction had to have occurred near the beginning of the Early Bronze Age period, according to the timeline presented here. This means that any archaeological claims about the location of the land of Sodom need to fit this timeline.

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Why Tall el-Hammam is not Sodom

This large and important archaeological site north of the Dead Sea is located opposite Jericho on the east side of the Jordan River (see figure 6, part 1). Steven Collins believes that Sodom must be a large ruin

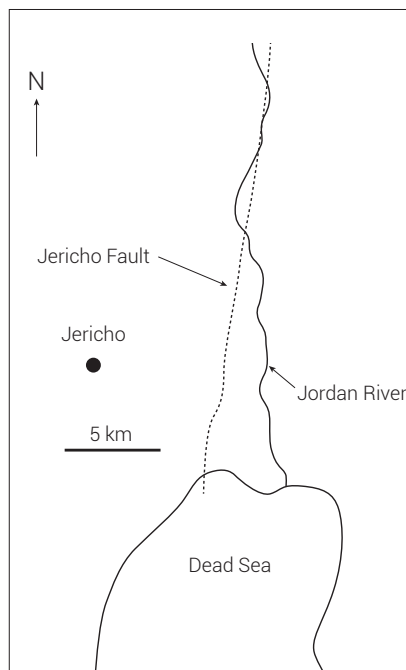


Figure 2. The Jericho fault (After Al-Zoubi *et al.*²⁹).

somewhere north of the Dead Sea.³⁰ With no other evidences in hand he essentially leaped to a decision that Tall (or Tell) el-Hammam must be Sodom. He does not, however, offer any ideas as to which of the other ruin mounds in the area might be the other four cities.

Tall el-Hammam qualifies for three of the criteria listed in part 1: it is located in a place that Lot could have possibly seen from Bethel/Ai, at least on a clear day; it is on the edge of the plains of Jordan; and, it is north of the Dead Sea. So far, so good.

But there are multiple reasons why this site cannot be a viable location for Sodom. For one thing, it lies on the east side of the Jordan River, and therefore is not in Canaan. We might wonder how a site on the east side of the Jordan could be considered to be in Canaan. Gary Byers of Associates for Biblical Research, who supports el-Hammam as Sodom, and has been on digs there over most of the past 10 years, explains that the border of Canaan is actually the mountainous ridge that runs along the east side of the Jordan and the Dead Sea.³¹ He overlooks the verses that we quoted in part 1, showing that the children of Israel had to cross the Jordan from east to west to get to the land of Canaan. Interestingly, Collins claims that Canaan never extended east of the Jordan.³² It would appear that Collins does not understand that Sodom had to be in Canaan.

Another problem with the el-Hammam site is that it was rebuilt after its major destruction, and had an extensive Iron Age occupation later on.³³ This does not accord with the biblical verses cited in part 2 that describe Sodom as being a wasteland forever after its destruction.

The chronology of the el-Hammam site does not fit because there is no destruction around the 3000 BC or earlier secular date (equivalent to biblical 1900 BC) that we are looking for. There is occupation of this site continuously from the Chalcolithic to the Middle Bronze II period.^{34,35} In fact, secular dating brings the major destruction of Tall el-Hammam so far forward that it is near to the time of the fall of Jericho in Joshua's time.³⁶ We might wonder whether, in fact, it was the children of Israel who destroyed el-Hammam, because God had told the people to conquer the cities in the territory east of the Jordan. They made this major military tour before camping at the Plains of Moab, just before crossing westward over the Jordan into the land of Canaan (Deuteronomy 2:26–3:17). This place where they camped, across from Jericho, was called Abelshittim (Numbers 33:49), the plains or meadows of Shittim ('the acacias'). It is suggested by many scholars that Shittim was the name of the nearby large Tall el-Hammam.³⁷

The chronological problems with respect to Tall el-Hammam do not bother Collins, however. He devotes an entire paper to explaining why he does not consider biblical numbers and dates to be solid or reliable, and that it is not the

biblical intent for those numbers to be taken realistically.³⁶ According to him, the Bible must bow to archaeological information, and he interprets the Bible to fit his belief that el-Hammam was Sodom. (However, he claims that he takes a high view of Scripture!) If he does not consider biblical dates and numbers to be reliable, why should he consider anything else in the Bible reliable? We might even wonder why he would believe that the cities of the plain actually existed, or that their destruction ever took place at all.

In his writings, Collins talks a great deal about something called the "kikkar of the Jordan", which he claims is a circle of territory at the north end of the Dead Sea.³⁸ Examination of a topographical map of Israel does not show any circle, however.³⁹ 'Kikkar' is a Hebrew word that has widely varied meanings,⁴⁰ but within the context of referring to the plains of the Jordan, its meaning appears to be the low land along each side of the Jordan River. In I Kings 7:46 and II Chronicles 4:17 (which are essentially identical passages) the kikkar of the Jordan where Hiram cast bronze for Solomon was between Succoth and Zarethan, two places that were considerably north of the Dead Sea. Therefore the kikkar of the Jordan cannot be defined as only an area just north of the Dead Sea; it obviously extended along the Jordan a considerable distance northwards. As shown in part 1, the land of Sodom must have been a narrow strip of land that extended along the Jordan River, and would therefore have qualified as being in the "plain of Jordan" of Genesis 13:10–11.

One criterion missing from the list in part 1 is the size of Sodom. This omission is not an error. There is no biblical or other clue to support Collins' belief that Sodom was a large city. Indeed, the narrative in Genesis 19:4–11, where "all the people of every quarter" crowded around Lot's house, might make us wonder whether the city was not really all that large.

For these many reasons, it is therefore concluded that Tall el-Hammam cannot be the site of Sodom.⁴¹

Miscellaneous timeline comments

The five cities of Bab Edh-Dhra, Numeira, Safi, Feifa and Khanazir include at least one, Numeira ('Gomorrhah'), that was not old enough to have been in existence at the time of the Sodom destruction in 3000 BC. In any case, all five cities were destroyed around 2600–2300 BC on the secular timeline, long after Abraham.⁴²

It has been commonly believed that the famous Ebla tablets contain mention of the destroyed cities of the plain. If so, this would be a problem, because the tablets date at most to 2500 BC (secular),⁴³ and the cities of the land of Sodom would no longer have been in existence at that time. However, it has been shown that the cities are not actually mentioned in the tablets, as first reported by Pettinato, whose early readings of the Ebla cuneiform have not been accepted

by later scholars.^{44–46} There is therefore no timeline difficulty posed by the Ebla tablets for an early date for Sodom.

This highlights the importance of considering the divergence of the biblical and secular timelines in comparing the order of historical events and people. If we do not do this, we can arrive at incorrect conclusions.

Summary

The destruction of the land of Sodom would have taken place around 3000 BC or earlier (secular), showing a divergence of at least 1,100 years between the biblical and secular timelines at this time. Among other things, this affects the culture of Sodom's era, who the united kings of Mesopotamia were, and the history of Jericho relative to the land of Sodom. Above all, it is a significant issue in dating any archaeological remains that are claimed to be Sodom. We have also seen why the level of the Dead Sea enters into this discussion, and why Tall el-Hammam cannot be Sodom.

Appendix

Support for Sodom's destruction near the end of the Early Bronze Age I⁴⁷

The argument for this date of Sodom's destruction is based on where we put Abraham in time. Abraham's place hinges on recognizing Joseph as the famous Imhotep of Egyptian history. Imhotep was vizier to Djoser, whose reign began about 2670 BC.⁴⁸ If that is when Joseph lived on the secular timeline, this moves his great-grandfather Abraham back before that by a considerable period of time.

Some brief comparisons of Joseph and Imhotep⁴⁹

- Joseph was promoted to vizier by pharaoh (Genesis 41:40–44); Imhotep was vizier for the third-dynasty pharaoh Djoser.⁵⁰
- Their names are similar. 'Joseph' sounds like 'Hotep'. It is most likely that the Egyptians took Joseph's Hebrew name and phonetically pronounced it in Egyptian.
- A severe seven-year famine was associated with both Joseph (Genesis 41–47) and Imhotep (famine stela inscription at Elephantine⁵¹), who both assisted the pharaoh in coping with it.
- Both were famous for great wisdom. The pharaoh called Joseph discreet and wise (Genesis 41:39). Imhotep was considered greatest of all in genius.⁵²
- Both were seers. Joseph predicted the future seven years of plenty and the future seven years of famine (Genesis 41:25–32). Imhotep was a highly regarded seer.⁵³

Conclusion: The probability that Joseph and Imhotep were the same person is very high, given the number of strong similarities.

Why Joseph fits in the third dynasty

- The Saqqara pyramid was built by Djoser in the third dynasty. Pharaoh became wealthy at this time from grain sold during the famine, and from grain collected as taxes, a system that Joseph set up (Genesis 47:14, 26). This is how Djoser could afford this historically unprecedented building project.
- Pharaoh could conscript the large amount of manpower needed for the Saqqara pyramid because at the end of the seven-year famine pharaoh owned all the people. Joseph arranged this by supplying the people with grain to survive (Genesis 47:13–26).
- Manetho started a new dynasty with Djoser because of major events in his time, such as revolutionary changes in architecture and society. We would argue that Joseph/Imhotep was responsible for these changes.
- The lifespan of Joseph was 110 years (Genesis 50:26). It is hardly coincidental that this same age was considered ideal in Egypt right back to very early times.⁵⁴ We might expect that this was because the famous Imhotep of the third dynasty had lived this long.

Placing Abraham and the date of Sodom's destruction on the secular timeline

We first need to find a crossover date for Joseph and Imhotep. For that, we will calculate when construction of the Saqqara pyramid by Djoser probably began, because this project is known to have been overseen by Imhotep.⁵⁵ If we allow for a few years of this pharaoh's reign before Joseph was promoted, plus 14 years for the seven years each of plenty and famine, this would take us perhaps 20 years into the pharaoh's reign before the beginning of construction of this pyramid. (We are making an assumption on this, because it was at the end of the famine period that the people were literally owned by the pharaoh, and were therefore available to be conscripted to work for him. However, construction could have begun earlier.) Djoser began his reign in about 2670 BC (secular time) as noted above, making the start of the Saqqara pyramid around 2650 BC. This is the date that we can use for placing Imhotep and Joseph together on the secular timeline.

Joseph was made vizier by the pharaoh in 1715,⁵⁶ 182 years after Sodom's destruction in 1897 (which was one year before Isaac's birth).⁵⁷ If we count 20 years to the beginning of the Saqqara pyramid, this makes a round figure of about 200 years back to Sodom's destruction/Abraham. This would appear to land Abraham at 2850 BC (secular time). But this is in the middle of the murky period of the first and second

dynasties, and like all the rest of the Egyptian timeline, there is every reason to believe that these dynasties are stretched out and contain extra time.⁵⁸ This means that 200 years on the biblical timeline could represent quite a bit more time at this distant period in Egypt's history.

So how far back would Abraham go? A plausible time would be somewhere around 3000 BC, the beginning of the first dynasty. There is in fact a hint in ancient secular history to support this date.

According to Genesis 12:10–13, there was a powerful pharaoh in place in Egypt, that Abraham had to deal with, and whom Abraham feared. The first king of the first dynasty is generally believed to be King Aha.⁵⁹ In this king's time, the colonies of Egyptians who had been living in south Palestine abandoned their residences and returned to Egypt for unknown reasons, but then returned to Canaan later on during the first dynasty.^{60–62} I suggest that the same severe famine in Canaan that drove Abraham to Egypt may have caused these Egyptians to return home at this time.

This is the reasoning behind putting Sodom's destruction around 3000 BC.

References

1. This figure is based on 215 years as the length of time that the children of Israel lived in Egypt. The apostle Paul supports a stay of 215 years in Egypt when he says in Galatians 3:17 that God's covenant with Abraham (in Canaan) was 430 years before the giving of the law. For more information on this, see Jones, F.N., *The Chronology of the Old Testament*, 16th edn, Master Books, Green Forest, AR, pp. 53–55, 2007. Jones (who follows the Masoretic), shows that internal calculations of Scripture indicate 215 years in Egypt. The LXX translations of Exodus 12:40 clearly indicate 215 years in Egypt, saying that 430 years was the time of residence in the land of Egypt and the land of Canaan.
2. Weintraub, D.A., *How Old is the Universe?*, Princeton University Press, Princeton, NJ, p. 2, 2011.
3. Osgood, A.J.M., The times of Abraham, *J. Creation* 2(1):77–87, 1986; creation.com/the-times-of-abraham.
4. Habermehl, A., Revising the Egyptian chronology: Joseph as Imhotep, and Amenemhat IV as pharaoh of the Exodus; in: Horstemeyer, M. (Ed.), *Proceedings of the Seventh International Conference on Creationism*, Creation Science Fellowship, Pittsburgh, PA, 2013. This paper is posted online (with permission) at creationsixdays.net/2013_ICC_Habermehl_Joseph.pdf.
5. Garfinkle, S.J., Ancient Near Eastern city-states; in: Band, P.F. and Scheidel, W. (Eds.), *The Oxford Handbook of the State in the Ancient Near East and Mediterranean*, Oxford University Press, New York, pp. 94–118, 2013; p. 95.
6. Strange, J., The Palestinian city-states of the Bronze Age; in: Hansen, M.H. (Ed.), *A Comparative Study of Thirty City-State Cultures: An investigation conducted by the Copenhagen Polis Centre*, vol. 21, Kongelige Danske Videnskabskabernes Selskab (Royal Danish Academy of Sciences and Letters), Copenhagen, Denmark, pp. 67–76, 2000.
7. Josephus, F., The Antiquities of the Jews; in: *The Works of Josephus*, 1987 edn, trans. W. Whiston, Hendrikson Publishers, Peabody, MA, 1:9:171, 1736a.
8. Josephus, F., The Wars of the Jews; in: *The Works of Josephus*, 1987 edn, trans. W. Whiston, Hendrikson Publishers, Peabody, MA, 4:8:452–454, 1736b.
9. Garfinkle, ref. 5, p. 113.
10. 'Chalcolithic' (meaning 'copper-stone') is the secular name given to the period of history that precedes the Bronze Age. In the standard evolutionary view of world history it is believed that humans first smelted copper, and then later learned how to add tin to make bronze. In the Near East, the Chalcolithic era is generally defined as lasting from as early as 5000 BC to as late as 3300 BC, although sources vary on these dates (for example, see Bienkowski, P. and Millard, A. (Eds.), *Dictionary of the Ancient Near East*, University of Pennsylvania Press, Philadelphia, PA, p. 70, 2000).
11. Enzel, Y., Bookman, R. (Tor, K.), Sharon, D., Gvirtzman, H., Dayan, U., Ziv, B., and Stein, M., Late Holocene climates of the Near East deduced from the Dead Sea level variations and modern regional winter rainfall, *Quaternary Research* 60:263–273, 2003.
12. All four kings were most likely from northern Mesopotamia, as it is logical that they would have ruled over domains that were fairly near to each other in order to form this military coalition. Shinar was a territory between the Tigris and Euphrates rivers in northern Mesopotamia, as Habermehl discusses in a detailed paper on the location of the Tower of Babel (see Habermehl, A., Where in the world is the Tower of Babel? *Answers Research J.* 4:25–53, 2011, answersingenesis.org/tower-of-babel/where-in-the-world-is-the-tower-of-babel/). Elam was most likely the city state of Elammu, known to historians to have been on the west side of the Euphrates below Carchemish. (Grayson, A.K., *Assyrian and Babylonian Chronicles*, Eisenbrauns, Winona Lake, IN, p. 254, 2000. Reprinted from original edition of J.J. Augustin, Locust Valley, New York, and Glückstadt, Germany, p. 254, 1975.) This kingdom is commonly confused with the country later called Elam in the south of Iran. Elam was the oldest son of Shem (Genesis 10:22) and this northern Mesopotamia location is most likely where he settled after the Babel dispersion (Habermehl, unpublished). The other two kingdoms, Ellasar and the unnamed group of nations, would have been located somewhere in the vicinity of Shinar and Elam in the north.
13. The Amorites were sons of Amori, 4th son of Canaan (Genesis 10:15–16). Their original territory was in the area of En Gedi, according to Scripture (Genesis 14:7: Hazezon-tamar is En Gedi).
14. Easton, M.G., *Illustrated Bible Dictionary*, 3rd edn, Thomas Nelson, Edinburgh, Scotland, 1897.
15. Stevens, A. (Ed.), The cities of the plain—have their ruins been found? Excerpt from *Bentley's Miscellany*, *The National Magazine* 5:442–445, 1854.
16. Frumkin, A. and Elitzur, Y., The rise and fall of the Dead Sea, *Biblical Archaeology Review* 27(6):42–50, 2001.
17. Strong J., *The Exhaustive Concordance of the Bible*, Abingdon Press, New York, and Nashville, TN, #3220, 1894.
18. Dyni, J.R., Geology and resources of some world oil-shale deposits, *U.S. Geological Survey Scientific Investigations Report* 2005-5294, 2006. See figure 10 on p. 19, deposit #5 at Nabi Musa at the north-west corner of the Dead Sea. This would be in the vicinity of the Vale of Siddim if Sodom was at the north end of the Dead Sea.
19. Zeuner, F.E., The Neolithic—Bronze Age gap on the Tell of Jericho, *Palestine Exploration Quarterly* 86(2):64–68, 1954.
20. See, for example, Rael, R., *Earth Architecture*, Princeton Architectural Press, New York, p. 113, 2009.
21. Hirst, K.K., Jericho (Palestine): the archaeology of the ancient city of Jericho, *About.com Archaeology*, 2014, archaeology.about.com/od/jterms/qt/jericho.htm, accessed 19 April 2017.
22. Laughlin, J.C.H., *Fifty Major Cities of the Bible*, Routledge, New York, 2006.
23. Nigro, L., Results of the Italian-Palestinian Expedition to Tell es-Sultan: at the dawn of urbanization in Palestine; in: Nigro, L. and Taha, H. (Eds.), *Tell es-Sultan/Jericho in the Context of the Jordan Valley: Site management, conservation and sustainable development*, Proceedings of the International Workshop held in Ariha, 7–11 February 2005 by the *Palestinian Department of Antiquities and Cultural Heritage*, pp. 1–40 (see p. 5, fn 8), 2006. There is some variation as to when the beginning of the Early Bronze Age is considered to have started.
24. Austin, S., Greatest Earthquakes of the Bible, *Acts & Facts* 39(10):12–15, 2010.
25. Neev, D. and Emery, K.O., *The Destruction of Sodom, Gomorrah, and Jericho: Geological, climatological, and archaeological background*, Oxford University Press, New York, p. 140, 1995.
26. Sarna, N.M., *Understanding Genesis*, vol. 1 of the *Melton Research Center Series, The Heritage of Biblical Israel*, Jewish Theological Seminary of America, McGraw-Hill Book Company, New York, p. 142, 1966.
27. Smith, G.A., *The Historical Geography of the Holy Land*, 30th edn, Ariel Publishing House, Jerusalem, Israel, 1966. Originally published by Hodder & Stoughton Ltd., London, UK, p. 327, 1894.
28. Gnanaraj, D., Fire from heaven? Archaeological light on the destruction of Sodom and Gomorrah (Genesis 19:23–28), *New Life Review* 1:1–12, 2012.
29. Al-Zoubi, A.S., Heinrichs, T., Qabbani, I., and ten-Brink, U.S., The northern end of the Dead Sea basin: Geometry from reflection seismic evidence, *Tectonophysics* 434:55–59, 2007.

30. Collins, S., The geography of the cities of the plain, *Biblical Research Bulletin of The Academic J. Trinity Southwest University* 2(1):1–17, 2002.
31. Byers, G., Tall el-Hammam 2008: A personal perspective, 2009, biblearchaeology.org/post/2009/01/12/tall-el-hammam-2008-a-personal-perspective.aspx, accessed 19 April 2017.
32. Collins, ref. 30, p. 8.
33. Collins, S., Hamdan, K., Byers, G.A., Haroun, J., Aljarrah, H., McAllister, S., Ludden, M.C., abut-Shmais, A., and Dasouqi, A., The Tall El-Hammam excavation project season activity report. Season Five: 2010 excavation, exploration, and survey, *Trinity Southwest University and Department of Antiquities of the Hashemite Kingdom of Jordan*, 2010.
34. The date of 3000 BC falls at the end of the Early Bronze I period in the Levant. The Chalcolithic precedes the Bronze Age, and the Iron Age succeeds the Bronze Age. These ages, developed by secular historians, are essentially evolutionistic because they assume that humans first used stone and copper, then moved on to bronze, and then eventually to iron. This does not agree with the Bible, which states that Tubalcain was “an instructor of every artificer in brass and iron” (Genesis 4:22) in the early times before the Flood.
35. Collins *et al.*, ref. 33, pp. 17–19.
36. Collins, S., Tall el-Hammam is *still* Sodom: critical data-sets cast serious doubt on E.H. Merrill’s chronological analysis, *Biblical Research Bulletin of The Academic J. Trinity Southwest University* 13(1):1–28, 2013; p. 8.
37. See, for example, the Shittim entry in Douglas, J.D. and Tenney, M.C., *Zondervan Illustrated Bible Dictionary*, Zondervan, Grand Rapids, MI, p. 1353, 2011.
38. Collins, ref. 30, pp. 5–6.
39. Israel (and autonomous areas), physical map, Carta, Jerusalem, Israel, 2008.
40. Strong, ref. 17, #3603.
41. Adamthwaite, M.R., has published a review of *Discovering the City of Sodom: The Fascinating, True Account of the Discovery of the Old Testament’s Most Infamous City*, by Collins, S. and Scott, L.C., Howard Books, New York, 2013, in *J. Creation* 30(1):33–36, 2016. He concludes that the Tall el-Hammam cannot be Sodom.
42. Jampoler, A.C.A., *Sailors in the Holy Land: The 1848 American Expedition to the Dead Sea and the Search for Sodom and Gomorrah*, Naval Institute Press, Annapolis, MD, 2005.
43. Dumper, M. and Stanley, B.E., *Cities of the Middle East and North Africa: A Historical Encyclopedia*, ABC-CLIO, Santa Barbara, CA, p. 141, 2007.
44. Archi, A., Are ‘The cities of the plain’ mentioned in the Ebla tablets? Cities identified by Pettinato are nowhere near the Dead Sea, *Biblical Archaeological Review* 7(6):54–55, 1981.
45. Roberts, J.J.M., *The Bible and the Ancient Near East: Collected Essays*, Eisenbrauns, Winona Lake, IN, pp. 12–14, 2002.
46. Chavalas, M.W., Assyriology and Biblical Studies: A century and a half of tension; in: Chavalas, M.W. and Younger, K.L., Jr. (Eds.), *Mesopotamia and the Bible: Comparative Explorations*, T & T Clark International, London and New York, pp. 21–67, 2003.
47. The Early Bronze Age I is generally considered to be about 3300–3000 BC (secular timeline) these days.
48. For example Oakes, L. and Gahlin, L., *Ancient Egypt*, Hermes House, Anness Publishing Inc., New York, p. 46, 2002. Currently most scholars accept approximately this date for Djoser, although Egyptian dates are always subject to tweaking by somebody or other.
49. The reasons listed here for equating Joseph with Imhotep are taken from a paper published by Habermehl, ref. 4, Part II. Further references for these points are in that paper.
50. Oakes and Gahlin, ref. 48, p. 91.
51. Lichtheim, M., *Ancient Egyptian Literature: A Book of Readings*, vol. 3: *The Late Period*, University of California Press, Berkeley, CA, pp. 94–100, 1980.
52. Asante, M.K., *From Imhotep to Akhenaten: An Introduction to Egyptian Philosophers*, Menaubuc, Paris, France, p. 67, 2004.
53. Parsons, M., Heliopolis, Egypt’s Iunu, *Tour Egypt*, 2011, touregypt.net/featurestories/heliopolis.htm, accessed 19 April 2017.
54. Taylor, J.H., *Death and the Afterlife in Ancient Egypt*, The British Museum Press, London, UK, p. 39, 2001.
55. Oakes and Gahlin, ref. 48, p. 46.
56. Jones, ref. 1, p. 278. The Jones chronology puts the children of Israel in Egypt for 215 years, which I support. However, whether or not it was 215 years does not affect where Abraham and Joseph go on the secular timeline—it only changes the number of years between the secular and biblical timelines at that point.
57. Jones, ref. 1, p. 278.
58. Secular scholars simply do not know for sure whether all the pharaohs of these dynasties reigned in series or concurrently, and for how long, or even whether some of these were pharaohs under different names. For example, see Wilkinson, T.A.H., *Early Dynastic Egypt*, Routledge, London and New York, pp. 55–91, 1999.
59. Tyldesley, J., *The Pharaohs*, Quercus Publishing Plc., London, UK, p. 22, 2009.
60. Raffaele, F., Dynasty 0, *Aegyptiaca Helvetica*, 17, pp. 99–141, 2003.
61. Porat, N., An Egyptian colony in southern Palestine during the Late Predynastic/Early Dynastic Period; in: van den Brink, E.C.M. (Ed.), *The Nile Delta in Transition: 4th–3rd Millennium BC: Proceedings of the Seminar Held in Cairo, 21–24 October 1990*, The Netherlands Institute of Archaeology and Arabic Studies, 1992.
62. Watrin, L., The relationship between the Nile Delta and Palestine during the fourth millennium: From early exchange (Naqada I–II) to the colonization of southern Palestine (Naqada III); in: Eyre, C.J. (Ed.), *Proceedings of the Seventh International Congress of Egyptologists*, Uitgeverij Peeters, Leuven, Belgium, pp. 1224–1226, 1998.

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Was Terah dead when Abraham left Haran?

Views on the meaning of Acts 7:4

Andrew Sibley

This paper discusses several views on the lifespan of Terah in relation to Abraham's departure from Haran to Canaan. There seems to be an anachronism between Stephen's speech in Acts 7:4 and the Masoretic Text of Abraham and Terah in Genesis 11:26, 32. The first consideration in response to the reference concerning the death of Terah is that Abraham left Haran when his father was *spiritually* dead. However, this doesn't appear to accord with a plain-sense reading of the text. Ussher's approach added 60 years to the time in Terah's life when Abraham was born. But, while numerically possible, this doesn't accord with the views of historical commentaries, whether Christian or Jewish, which weakens its status. Two alternative approaches were then considered. Bruce points to correlation between Acts 7:4 and the Samaritan Pentateuch and Philo. According to Bruce, this suggests that there existed a textual recension in first century Judea that agreed with the Samaritan text. While the preferred solution, textual evidence is limited to fragments from the Dead Sea Scrolls, so further research will be necessary to render it more conclusive. Augustine's argument was also discussed, that the text does not intend to imply the *settlement* of Abraham in Canaan until Terah's death. But, while possible, it doesn't seem to flow from the most straightforward reading of the text.

There is a chronological difficulty regarding the date of Abraham's birth in relation to the age of Terah. The purpose of this paper is to provide an overview of responses offered by theologians, although this is not an exhaustive study. Stephen's speech to the Sanhedrin (figure 1), recorded by Luke in Acts 7:4, states that Abraham left Haran after Terah had died. Terah's family moved from Ur of the Chaldeans to Haran, then Abraham departed from there to the promised land of Canaan when he was 75 years of age (figure 2). If the period recorded in the Old Testament Masoretic Text (MT) from Terah's birth to Abraham's (then Abram's) birth (70 years) is integrated with the time Abraham left Haran (75 years), a period of only 145 years for the life of Terah would be established. But the information given is that Terah died at the age of 205 years, leaving a gap of sixty years. The relevant Old Testament verses (ESV) are as follows, with Hebrew MT inserts:

"When Terah had lived 70 years [שבעים שנה]; šib-'im šā-nāh], he fathered Abram, Nahor, and Haran" (Genesis 11:26).

"The days of Terah were 205 years [שנים ומאתים וחמש]; and Terah died in Haran" (Genesis 11:32).

"Abram was seventy-five years [חמשים ושבע שנים] old when he departed from Haran" (Genesis 12:4).

And in the New Testament Acts 7:2–4:

"And Stephen said: 'Brothers and fathers, hear me. The God of glory appeared to our father Abraham when he was in Mesopotamia, before he lived in Haran, and said to him, "Go out from your land and from your kindred and go into the land that I will show you." Then he went out from the land of the Chaldeans

and lived in Haran. And after his father died, God removed him from there into this land in which you are now living.'"

Acts 7:4 reads in Greek as follows:¹

"τότε ἐξελθὼν ἐκ γῆς Χαλδαίων κατέκησεν ἐν Χαρράν. κακεῖθεν μετὰ τὸ ἀποθανεῖν τὸν πατέρα αὐτοῦ μετόκισεν αὐτὸν εἰς τὴν γῆν ταύτην εἰς ἣν ὑμεῖς νῦν κατοικεῖτε."

The speech of Stephen would seem to be at odds with the MT of Genesis if Abraham really had left Haran after Terah had died. Josephus, in his *Jewish Antiquities*, written in the late first century AD, follows the chronology of the Septuagint (LXX), and in this regard records the same ages and periods as the MT:

"For Therrus begat Abraham at the age of 70 [ἐβδομήκοστῷ; hebdomékosto, LXX ἐβδομήκοντα; hebdomékonta]. ... they all migrated to Charran in Mesopotamia, where Therrus also died and was buried, after a life of 205 [πέντε και διακόσια; pente kai diakosia, LXX διακόσια πέντε; diakosia pente] years.' And 1.7.1 'Now Abraham, having no legitimate son, adopted Lot, his brother Aran's son and the brother of his wife Sarra; and at the age of seventy-five [εβδομηκοντα και πέντε; hebdomékonta kai pente, LXX πέντε εβδομηκοντα; pente hebdomékonta] he left Chaldaea, God having bidden him to remove to Canaan, and there he settled, and left the country to his descendants.'"²

In response to this apparent anomaly several solutions have been proposed, and these are discussed below. Bishop Ussher suggested that the MT does not say Abraham was



Figure 1. Painting by Mariotto di Nardo, 1408. Originally a predella panel in Pieve di Santo Stefano in Pane in Rifredi, near Florence. It represents the defence of Stephen before the High Priest and Elders of the Sanhedrin. Now located in the National Museum of Western Art, Ueno Park, Taito, Tokyo.

born 70 years into Terah's life, but that Terah started having children when he was 70, and Abraham was actually born 60 years later when Terah was 130 years old.³ Another position, argued for by F.F. Bruce, is that Stephen might have been following the text of the Samaritan Pentateuch (SP), which records that Terah lived to only 145 years (Genesis 11:32), or, as a related claim, that an earlier version of the Greek text that Stephen was referencing also recorded a date of 145 years, but has subsequently been lost.⁴ Genesis 11:32 (SP) reads as follows:

“And the days of Terah were hundred and forty five years [חמש שנים וארבעים ומאת שנה; ḥā-mêš šā-nîm wə-’ar-bā-’îm ū-mā’at šā-nāh]: and Terah died in Haran”⁵

There are several other possibilities discussed in the historical literature: for instance, the proposal that Terah died *spiritually* prior to Abraham's departure in the Midrash Rabbah on Genesis (*B'reshith Rabba*),⁶ and a couple of notable proposals by Augustine in *The City of God* (*De Civitate Dei Contra Paganos*).⁷ Although Augustine's comment that Abraham's birth might be a reference to passage through the fire of the Chaldeans is not convincing. This paper assumes that Stephen's speech, and Luke's recording of it, was intended to be taken literally and based upon real chronology. While it has been suggested that Stephen might have made an error, the evidence suggests that Luke was a careful historian who wrote intentionally.⁸



Figure 2. Painting by József Molnár, *Abraham's Journey from Ur to Canaan*, 1850, located in the Hungarian National Gallery, Buda Castle, Budapest

Did Terah die spiritually in Haran?

Several Jewish commentators have elaborated on this passage, but for different reasons. It is suggested, for instance, in the *B'reshith Rabba* that Terah might have been reckoned dead in his lifetime because of his idolatry (see also Joshua 24:2). There was concern among the rabbinical commentators that it would break a Mitzvah (commandment) for Abraham to leave his father before he had died, except that God's calling provided an exemption for Abraham

because his father was *counted* dead, even though living.⁹ This is alluded to in Rashi's commentary on Genesis 11:32: he wondered why Terah's death was mentioned in Genesis before Abraham departed for Canaan, and suggests it implied the spiritual death of Terah.¹⁰ However, it should not be forgotten that the later rabbis were somewhat detached from first-century Judea.

The view that one might be counted dead while still living is not evident elsewhere in the early chapters of Genesis despite references to some very notorious characters such as Cain and Nimrod, who were greater rebels than Terah. And there is some suggestion that Terah repented of his idolatry, as Lightfoot recorded.¹¹ It should be noted that Jewish sources had little interest in trying to defend Stephen's speech as they believed him to have been in error. They were more concerned with trying to defend Abraham from the charge that he abandoned his father. However, a few Christian commentators have taken the idea of spiritual death and proposed that use of the word *ἀποθανεῖν* [apothanein] in Acts 7:4 does not necessarily imply physical death, but more likely the spiritual death of Terah. However, this is not really borne out in the context as Meyer points out.¹² The predominant usage of this verb in the New Testament implies physical death (exceptions are possibly found in Galatians 2:19 and 1 Corinthians 15:31).¹³

A related claim by some neologists, such as Johann David Michaelis, is that the text of Genesis was not meant to be taken as strict chronology because it arose through different sources and was written for spiritual or prophetic reasons, not as comprehensive history. Although Michaelis did not believe the Bible was incorrect, he considered that it was not factually complete.¹⁴ However, this period saw the beginning of a compromise in German theological thought that led to higher biblical criticism and eventually the rejection of Christianity. The separation of the spiritual from physical reality also has echoes of Gnosticism. But the carefully recorded chronology of Genesis supports quite the opposite (a literal understanding of the text) and reveals a faith grounded in reality. The likelihood is that Stephen, in his speech, as relayed by Luke in Acts, intended to imply the physical death of Terah.¹⁵

Ussher's additional 60 years

The solution offered by Ussher is found in his *Annals of the World*, produced in the mid-seventeenth century. This work follows the timeframe of the MT, but adds 60 years to the period leading up to Abraham's birth. He does so by concluding that it was just the elder son, Haran, who was born seventy years into the life of Terah and that Abraham (the youngest of the three) was in fact born when Terah was 130 years old. Ussher writes:

"When Terah was 70 years old, his oldest of three

sons, Haran was born. Ge 11:26 Abram was not born for another 60 years. ... Abram was born. He was 75 years old when Terah his father died at the age of 205 years."¹⁶

As well as trying to resolve the problem of Acts 7:4, one of the reasons for Ussher's addition was a belief that a rounded 4,000 years should complete the period from creation to the birth of Christ, assuming, as he maintained, Jesus was born in 4 BC. This is, however, different than the earlier chronology of Bede, who placed the creation epoch in 3952 BC.¹⁷ Other theologians, writing prior to Ussher, calculated the period from Creation to Christ as between 3,929 and 4,000 years, as William Perkins, for instance, noted. There were only a few, however, who saw the need to complete 4,000 years.¹⁸ But in other respects Ussher followed Bede by adopting a similar approach that followed the text of the MT instead of the LXX, although it may be noted that no attempt was made in Bede's work to address the problem that arises from Stephen's speech in Acts 7:4.

Several commentators have come to accept Ussher's calculations. A contemporary of Ussher, John Lightfoot, also allowed an additional 60-year period in his chronology.¹⁹ Among modern Christians who hold to a literal reading of Genesis, Jonathan Sarfati finds it attractive,²⁰ as do several others with the suggestion that the 60 years might even be a minimum value. The further proposal is that it is possible to assume an additional 50 years from Terah's death to Abraham leaving Haran for Canaan.²¹ However, not all evangelical Christians of the 20th century have found Ussher's correction convincing; the well-known scholar and Christian apologist F.F. Bruce suggested it was an 'improbable expedient' and preferred a different solution (discussed below).²² James Barr, who does not support Mosaic inerrancy, also thought that Ussher's reading does not follow naturally from the text, and that it forced an extra 60 years onto the subsequent chronology through the rest of the Old Testament.²³ We may also wonder why Abraham would consider it unusual to be childless into his nineties if he was born when his father was 130 years old. There is also a need to at least acknowledge Jewish and rabbinic commentaries on Genesis (even if one questions their accuracy) that suggest that it was Abraham who was born 70 years into the life of Terah, for instance Josephus's *Jewish Antiquities* and the fourth-century *B'reshith Rabba*. The later medieval *Sefer haYashar*, which may be regarded as a later rabbinical commentary of unknown origin, has Haran and Nahor as twin brothers, born when Terah was 38 years old.²⁴

Samaritan Pentateuch shortens Terah's life

The alternative solution of Bruce asserts that Stephen, in his speech, was probably following a Greek Old Testament

recension that was in agreement with the Samaritan Pentateuch on this matter, even though no known copies of such a text remain.²⁵ As noted, the SP places the end of Terah's life at 145 years old, instead of the 205 years of the MT and LXX, which would overcome the apparent anachronism and offers a modified chronology that is closer to Bede than Ussher.²⁶ Bruce's commentary also points out that Philo, the Greek-speaking Jewish academic of the first century, seems in agreement with Stephen in Acts 7:4 and the SP in asserting that Abraham left Haran after Terah had died. Philo writes:

"And Abraham was,' he says 'seventy and five years old when he went out from Haran' (Gen. xii. 4). ... No one versed in the Laws is likely to be unaware that at an earlier date Abraham migrated from Chaldea and dwelt in Haran, and that after his father's death there, he removes from that country also."²⁷

Trying to piece together Hebrew and Greek Old Testament manuscripts from the second temple period is problematic. Fitzmyer points out that evidence from the Qumran caves suggests greater diversity in early first-century manuscripts than previously thought, and that the LXX in fact represents an older Hebrew text-type.²⁸ There is evidence that both the LXX and SP may have been derived from a commonly used Hebrew version. Cohen writes:

"The Dead Sea scrolls decided these issues, by showing that there was indeed a Hebrew text-type on which the Septuagint-translation was based and which differed substantially from the received MT. These findings also confirmed that most of the textual phenomena in the Samaritan version (aside from ideological changes) were part of a Hebrew text-type in common use outside of the Samaritan community as well, during the Second Temple period in the Land of Israel."²⁹

This evidence from Qumran offers support to Bruce's position that there were earlier text types that were similar to the SP, but somewhat different to the MT, and provided the foundation for both the LXX and SP. However, even though some passages of Genesis have been found among the Dead Sea Scrolls, none have yet been found or published of this specific account, except perhaps fragmentary evidence in the form of a paraphrase of Genesis 12:4–5 from Cave 4 (4Q8b).³⁰ Bruce's view has some attractions and has gained support from research and textual evidence found among the Dead Sea scrolls.

Augustine claims Abraham did not settle in Canaan

Augustine offered a number of solutions in the *City of God*, although the first of which seems rather *ad hoc* and is not overly convincing. Firstly, he proposed that the time in Abraham's life when he left Haran might be "reckoned from the year in which he was delivered from the fire of

the Chaldeans ..." and not from the time of his birth.⁷ The second proposal in Augustine's work may have more substance and suggests that the implied meaning of Acts 7:4 is that although Abraham left for Canaan while Terah was still alive, he did not *settle* in the promised land until after his father had died:

"... he does not say, after his father was dead he went out from Haran; but thenceforth he settled him here, after his father was dead. ... But he says that his settlement in the land of Canaan, not his going forth from Haran, took place after his father's death."³¹

This latter view of Augustine does gain some support from Peter Pett in his recent commentary on Acts 7:4.³² He comments that Abraham may have wandered the Promised Land with his flocks while his father lived in Haran, but that it would not be considered appropriate to describe the settlement of Abraham in the new land until after his father's death in the old home town. With this perspective, Abraham would have been considered living as part of his father's household, even though wandering and living in tents in Canaan. In further response to Augustine's view, the context and terminology of the passage in Acts needs to be considered.

The Greek text uses the phrase 'he removed him' [μετόκισεν αὐτὸν / *metōkisen auton*] into the land. It may be seen that the root of the word *metōkisen* comprises of 'meta', with the implied meaning of *after* or *change*, and 'oikos', meaning *dwelling place*. It can be translated as 'remove to another place', 'migrate', or 'carry away'. So, when did Abraham change his dwelling place and settle? The next verse (Acts 7:5) tells the reader that Abraham was not able to take possession in the land that was given to him [οὐδὲ βῆμα ποδός, *oude bēma podos*, not even length of a foot]³³, but that it was a promise for his offspring. Instead he was a wanderer upon his promised acreage, even though it was to be the inheritance of his descendants. This supports Augustine's point (even though Augustine's knowledge of Greek was limited). The point Stephen makes is that Abraham was looking for another land that is not of this world, just as Stephen's own mind was focused upon the glory of God. So, did Abraham actually settle in the land? It would seem that Augustine considered that Abraham only settled in the land when he purchased a field for Sarah's burial (Genesis 23:3–4).³⁴

"Then Abraham bought a field, in which he buried his wife. And then, according to Stephen's account, he was settled in that land, entering then on actual possession of it,—that is, after the death of his father, who is inferred to have died two years before."³⁵

The dates given in the MT imply Sarah's death was two years after Terah had died, reflected in some Hebrew commentaries, for instance the *Seder Olam Rabbah*.³⁶ In this regard Abraham was 137 years old when Sarah died at 127 years old, and so Terah died when Abraham was 135

years of age. The *Book of Jubilees* also offers some support to Augustine's view as it suggests that the initial travel of Abraham from Terah was for the purpose of finding a place of settlement for the whole family, with the intention of bringing Terah and Nahor into it:

"And if thou seest a land pleasant to thy eyes to dwell in, then arise and take me to thee and take Lot with thee, the son of Haran thy brother as thine own son: the Lord be with thee. And Nahor thy brother leave with me till thou returnest in peace, and we go with thee all together."³⁷

If that is close to a true account, the fact that Abraham did not send for his family to join him suggests he had not at that time settled. Unfortunately, *Jubilees* does not tell us when Terah died, and the calling of Abraham included the commitment to leave the rest of his family behind.

On a related point, the original text doesn't actually say directly that it was God who removed Abraham to Canaan, even though some modern texts inform the reader that it was. But, as noted, the text reads that after the death of his father, "he removed him" [μετόκισεν αὐτὸν / *metōkisen auton*]. Who is this referring to? There are three persons in this passage: God, Abraham and Terah, and there is some uncertainty over the reference. Gill, for instance, points out that some translators had different opinions. The Ethiopic version, for instance, has "he removed himself", implying Abraham removed himself, while the Syriac version has it as "God removed him".³⁸ So, given this ambiguity one might be able to make a case that the verse ought to be rendered to imply that Abraham carried his father into the land after his death and buried him there, and that that was the time of settlement. The "he removed him" would not then be an action between God and Abraham, but between Abraham and Terah's post-mortem body. However, the view that Terah was buried in Canaan by Abraham does not appear in Jewish commentaries, for instance Josephus,³⁹ and local tradition holds that Terah is buried in Haran, both of which undermine this secondary argument.

Summary

This paper has discussed a problem that arises with Stephen's speech, which is recorded by Luke in Acts 7:4. For those committed to biblical inerrancy the problem involves an apparent anachronism that relates to the time of Terah's death with respect to Abraham's departure to Canaan. Stephen suggested Terah had died before Abraham left, while Terah's lifespan given in the MT indicates otherwise (Genesis 11:26, 32). Several possible solutions have been discussed.

A few 18th-century Christian commentators followed rabbinical thought in proposing that Terah died *spiritually* in Haran, although it may be noted that the rabbis had different motives than the Christian theologians. However, spiritual death doesn't seem to be indicated by a plain-sense reading

of the text of Acts 7:4, and the likelihood is that Stephen and Luke intended to imply Terah's physical death. This position is not argued for by more recent Christian commentators. Ussher's approach, which added 60 years to the birth of Abraham, is at least numerically consistent with the MT, but it is a novelty, and not supported by earlier Christian or rabbinical thought and this potentially weakens its validity.

Other than Ussher's novel approach, there are two main feasible alternatives that deal with Terah's physical death. The more promising one is along the lines of Bruce's suggestion that there existed a textual recension that correlated with the SP's 145-year lifespan of Terah and supported Philo's commentary and Stephen's assertion. In support of this, several Dead Sea scroll scholars maintain that the Qumran evidence points to the prior existence of such a textual tradition in early first-century Judea. Unfortunately, much of this recension has been lost, even though some fragmentary evidence has appeared among the Dead Sea scrolls that demonstrates correlation. At present knowledge of such a recension is incomplete; further research may well shed light upon it.

The other solution discussed here was outlined by Augustine in the *City of God*. His argument holds that the intent of the text is not to tell us when Abraham left Haran, but when he *settled* in Canaan. This settlement occurred following the purchase of land by Abraham in which to bury his wife Sarah. It may be possible to make a case for this from the meaning of the Greek word *metōkisen*, and the text of Acts 7:5, even though it is not firmly established that this was Stephen's intended meaning. Overall, Bruce's position seems to offer the strongest solution and may be strengthened by further research into textual traditions that existed in the second temple period.

References

1. From the Nestle-Aland 28th edn text, sourced from nestle-aland.com. This verse is identical in the Textus Receptus, for instance the 1550 *Editio Regia* of Robert Estienne (Stephanus) τότε ἐξελθὼν ἐκ γῆς χαλδαιῶν κατοικήσεν ἐν χαρραν κακείθεν μετὰ τὸ ἀποθανεῖν τὸν πατέρα αὐτοῦ μετόκισεν αὐτὸν εἰς τὴν γῆν ταύτην εἰς ἣν ὑμεῖς νῦν κατοικεῖτε.
2. The LXX periods are from Rahlfs, A. and Hanhart, R. (Eds.), *Septuaginta* (Editio Altera), Hendrickson Publishers, Peabody, MA, 2007; Josephus, *Jewish Antiquities*, translated by Thackeray, H.St.J., Books I–V, William Heinemann and Harvard University Press, London & Cambridge, MA, 1.6.5, pp. 73–75, 1966.
3. Ussher, J., *The Annals of the World*, translated by Pierce, L. and Pierce, M., Master Books, Green Forest, AR, pp. 22–23, 2003.
4. Bruce F.F., *The New International Commentary on the New Testament: The Book of Acts*, revised edition, Eerdsman, Grand Rapids, MI, pp. 134–135, 1988.
5. This has been sourced from sites.google.com/site/interlinearpentateuch/home, and is based on Walton's Polyglot of 1657.
6. Midrash Rabbah on Genesis (*B'reshith Rabba*), Transl. and edited by Rabbi Freedman, H. and Simon, M., vol. 1. 39:7–8, The Soncino Press, London, pp. 314–315, 1939.
7. Augustine, *City of God*; in: Schaff, P. (Ed.), *Nicene and Post Nicene Fathers* (NPNF), Series 1, vols. 1–8, T. and T. Clark, Edinburgh, UK, 1886–1890, 16:15 & 16:32.

8. See, for instance, Koivisto, R.A., Stephen's Speech: A Theology of Errors? *Grace Theological J.* 8(1):101–114, 1987; MacArthur, J.F., *The MacArthur New Testament Commentary: Luke 1–5*, Moody Publishers, Chicago, IL, p. 14, 2009.
9. Midrash Rabbah on Genesis, ref. 6. It would seem that Nahor was also the surviving older brother and his family was in Haran in the region of Aram Naharaim when Abraham sought a wife for Isaac.
10. The Judaica Press *Complete Tanach with Rashi* (in English and Hebrew), translated by Rabbi A.J. Rosenberg, 1998, available at chabad.org.
11. Lightfoot, J., Hebrew and talmudical exercitations upon the Acts of the Apostles; in: Rev. Pitman, J.D. (Ed.), *The Whole Works of the Rev. John Lightfoot D.D.*, vol. xiii, London, chap. vii.iv, pp. 419–4421, 1823.
12. Meyer, H., On Acts 7:4; in: Christie, P. and Crombie, F. (Trans. and Eds.), *Critical and Exegetical Commentary on the New Testament* (from 6th German edn), T. and T. Clark, Edinburgh, UK, 1880. Meyer references this view to Johann David Michaelis' *de chronol. Mos. post diluv.* sec. 15.
13. In Galatians 2:19 Christians are said to die to the Law, and in 1 Corinthians 15:31 Paul says he dies daily.
14. Reill, P.H., *The German Enlightenment and the Rise of Historicism*, University of California Press, Berkeley, CA, p. 83, 1975.
15. Koivisto, Stephen's Speech, ref. 8.
16. Ussher, ref. 3, 58 and 63, pp. 21–25.
17. Bede: *The Reckoning of Time*, Wallis, F. (Trans.), Liverpool University Press, Liverpool, UK, p. 165, 1999: "Terah at the age of seventy begat Abraham, and lived thereafter 135 years. ... 2023 [AM] Abraham ... was 75 years old when he left his native country at God's command and went to the land of Canaan."
18. Perkins, W., *An exposition of the Symbole or Creed of the Apostles*, printed by John Legatt, printer to the University of Cambridge, UK, pp. 60–61, 1595, "Some say there bee 3929. from the creation to Christes birth as *Beroaldus*: some 3952 as *Heirome* and Bede: some 3960 as *Luther* and *Io. Lucidus*: some 3963 as *Melancton* in his Chronicle, and *Functius*: some 3970. As *Bullinger* and *Tremellius*: some towards 4000. as *Buntingas*." This was also noted by Hall, D.W., A Brief Overview of the Exegesis of Genesis 1–11: Luther to Lyell; in: Mortenson T. and Ury T.H. (Eds.), *Coming to Grips with Genesis*, Master Books, Green Forest, AR, 2008.
19. Lightfoot, J. *Acts of the Apostles*, ref. 11.
20. Sarfati, J., *The Genesis Account: A theological, historical, and scientific commentary on Genesis 1–11*, Creation Book Publishers, pp. 685–703, 2015; Sarfati, J., Biblical Chronogenealogies, *J. Creation* 17(3):14–18, 2003.
21. Hardy, C. and Carter, R., The biblical minimum and maximum age of the earth, *J. Creation* 28(2):89–96, 2014. Cosner, L. and Carter, R., Textual traditions and biblical chronology, *J. Creation* 29(2):99–105, 2015; Williams, P., Some remarks preliminary to a biblical chronology, *J. Creation* 12(1): 98–106, 1998.
22. Bruce F.F., *The New International Commentary on the New Testament: The Book of Acts*, rev. edn, Eerdsman, Grand Rapids, MI, pp. 134–135, 1988. See also Kahle, P.E., *The Cairo Geniza*, The Schweich Lectures of the British Academy, Oxford University Press, London, UK, pp. 143–145, 1947.
23. Barr, J., Why the world was created in 4004 bc, Archbishop Ussher and Biblical chronology, *Bulletin of the John Rylands University Library* 67: 575–608, 1984–1985.
24. Midrash Rabbah on Genesis, ref. 6: "For Terah was seventy years old at Abram's birth, whilst Abram departed from Haran at the age of seventy-five; hence Terah, whose age at death was two hundred and five, died sixty-five years after this command, and yet it is narrated before." Josephus, ref. 2: "For Therrus begat Abraham at the age of 70 [ἑβδομήκοστό; hebdomékosto]". Sefer haYashar, Parry, J.H. (Ed.), Parry and Company, Salt Lake City, UT, 1887, Claimed 1st edn 1552 Naples, surviving printed edn from Venice 1625 CH 7.22: "and Terah was thirty-eight years old, and he begat Haran and Nahor".
25. Bruce, ref. 22 and Kahle, ref. 22. Leaving aside political disputes, the SP was in fact seen as an acceptable popular recension of the Hebrew Text in first-century Judea.
26. Similarity between Stephen's speech and the SP has been noted by some scholars to the point where it is suggested that Stephen was in fact a Samaritan (Anderson, R.T. and Giles, T., *The Samaritan Pentateuch: An Introduction to its Origin, History and Significance for Biblical Studies*, Society of Biblical Literature, Atlanta, GA, 126–130, 2012; and Spiro, A., appendix v, Stephen's Samaritan Background; in: Munck, J. (Ed.), *The Acts of the Apostles*, The Anchor Bible, Garden City, NY, pp. 285–300, 1967). More likely Stephen was a Greek-speaking Jew. Bruce comments that such a link to Samaria is not warranted, even though there are a number of places in Acts 7 that seem to follow more closely the beliefs and texts of the Samaritans: for example, mention of Abraham's purchase of land in Shechem (Acts 7:16), and inclusion of the plural *Fathers* instead of *Father* in Acts 7:32 (cf. Exodus 3.6: MT has *father*, אבִי versus SP *fathers* אבותֵינוּ). The Greek *Fathers*, πατέρων, paterōn Nestle-Aland 28th edn (see Bruce, ref. 22). These assertions, included in Luke's careful historical account, seem to be deliberate according to Koivisto, and are probably a response to the accusation that Stephen was corrupting the writing of Moses (Koivisto, ref. 8, Acts 6:8–15).
27. Philo, On the Migration of Abraham, XXXII; in: Yonge, C.D., (Trans.), *The Works of Philo*, Hendrickson, Peabody, MA, pp. 176–177, 270, 1992. See Bruce ref. 22. Marshall also suggests Luke's account was based upon a first-century source that agreed with the SP, but is now lost. Marshall, L.H., *Tyndale New Testament Commentary, Acts*, IVP, Leicester, UK, p. 135, 1996.
28. Fitzmyer, J.A., *The Dead Sea Scrolls and Christian Origins*, W.B. Eerdmans, Grand Rapids, MI, 7, 2000: "The Qumran biblical texts thus show that the Greek translation in the LXX was not carelessly done but represents a different text tradition, which is now known."
29. Cohen, M., The Idea of the Sanctity of the Biblical Text and the Science of Textual Criticism; translated from *HaMikrah V'anachnu*, (Eds., Uriel Simon, HaMachon L'Yahadut U'Machshava Bat-Z'manenu and Dvir, Tel-Aviv, 1979.
30. Fitzmyer, ref. 28, p. 30. Davila '8.4Q8', DJD12 61-64, as 4Q Gen^{h-pat} is a paraphrase of Genesis 12:4–5.
31. Augustine *City of God*, ref. 7, NPNF, 16:15.
32. Pett, P., Commentary on Acts 7:4; in: *Peter Pett's Commentary on the Bible*, sourced at studylight.org. 2013.
33. From the Nestle-Aland 28th edn text, sourced from nestle-aland.com (and same with Stephanus TR *Editio Regia*). Acts 7:5 ESV: "Yet he gave him no inheritance in it, not even a foot's length, but promised to give it to him as a possession and to his offspring after him, though he had no child."
34. Genesis 23: 3–4—"Then Abraham rose from beside his dead wife and spoke to the Hittites. He said, 'I am a foreigner and stranger among you. Sell me some property for a burial site here so that I can bury my dead.'" But note Stephen's assertion that Abraham also purchased land in Shechem (Acts 7:16).
35. Augustine *City of God*, ref. 7, NPNF, 16:32.
36. Rabbi Jose ben Halafta (Trans. Guggenheimer, H.W.), *Seder Olam Rabbah: The Rabbinic View of Biblical Chronology*, Rowman and Littlefield Publishers, Lanham, MD, p. 18, 1998.
37. Jubilees 12:30–31; in: Charles, R.H., *The Apocrypha and Pseudepigrapha of the Old Testament*, Clarendon Press, Oxford, UK, 1913.
38. Gill, Commentary on Acts 7:4, *An Exposition of the New Testament*, 1746–1748.
39. Josephus, *Jewish Antiquities*, 1.6.5., ref 2.

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Not enough rocks: the sedimentary record and deep time

John K. Reed and Michael J. Oard

Since its inception, uniformitarian geology has argued that the Genesis Flood could not have deposited the volume of sedimentary rocks found in Earth's crust. This rhetoric has effectively diverted attention from the problem the sedimentary record creates for uniformitarian geology. An actualistic comparison of observed modern sedimentation rates to the total volume of Earth's sedimentary rock demonstrates that the real volume is surprisingly small relative to modern rates. This problem is reinforced by observed rates of erosion, which should have produced a much greater volume of rock than observed. Auxiliary explanations are advanced to account for these discrepancies, but the fact remains that the volume of the sedimentary record is no friend of uniformitarians. This discrepancy offers them three unpalatable choices: (1) Earth is not billions of years old, (2) the rock record is not a representative record of history, or (3) actualism is a poor forensic assumption.

What is the relationship between the sedimentary rock record and Earth's past? It is not presently clear, thanks to a long history of polemics against the Genesis Flood and for gradualist deep time:

"Much more persuasive was ... the huge piles of Secondary['] strata that were being described in certain parts of Europe. A century earlier, when such rocks had yet to be studied closely, it had been quite plausible to suppose ... that the entire pile of sediments could have been laid down all at once... However, once the sheer thickness of the Secondary formations was fully appreciated, and detailed fieldwork suggested that many of them must have been deposited layer by layer under tranquil conditions, that kind of diluvial interpretation was quietly abandoned by most savants."²

In other words, there are 'too many rocks' for the Flood. In a short time, this questionable argument³ became a rhetorical flourish, resonating with the public via the visual appeal of large-scale outcrops, like those at Grand Canyon or in the Alps. Despite logical rigour, many Christians have also been successfully diverted from uniformitarian problems by this old argument:

"The question is whether minimally seven miles of fine-grained sediments and volcanic rocks accumulated in only one and a half millennia [*sic*]. We would be talking about an average sedimentation rate of about 20 feet per year for 1,656 years! If these rocks were all deposited during a one-year planetary Flood, however, then the sedimentation rate was seven miles or at least 36,000 feet per year! Do Flood geologists really expect anyone to believe that?"⁴

Such polemics preclude an objective examination of the relationship between rocks and history. Logic allows five possible relationships between the sedimentary record and

the opposing paradigms of natural history (figure 1). Since uniformitarian rhetoric has long obscured these, let us reverse the argument and examine how well *secular* history explains the sedimentary record.

In evaluating any relationship between the sedimentary rock record and Earth's past, the hard data available include: (1) estimates of the total volume of sedimentary rocks, and (2) observed sedimentation rates in modern settings. Observed sedimentation rates should produce a much greater volume of sedimentary rock over deep time. This problem puts secularists in a corner. They must choose between: (1) a younger Earth, (2) an unrepresentative historical record, or (3) the rejection of actualism and its claim that modern processes are alone representations of the past. Any of these choices is fatal to pure uniformitarian geology.

Earth's sedimentary record—the big picture

The first factor is the volume of Earth's sedimentary record. Despite its complexity, it can be examined as a whole, and has been by geologists. Ronov⁵ described the sedimentary rock record as the 'stratisphere'—the sedimentary and volcanic outer shell of Earth's crust, occupying some 11% of the crust by volume. Geologists estimate a range for this 'stratisphere', but many⁶ cite Ronov's estimate of 1,100,000,000 km³. Ronov⁵ differenced maps between the land surface and the igneous and metamorphic basement to obtain a total volume, and then fleshed it out with voluminous lithologic data from wells, cores, and the literature. His detailed work examined rocks by lithology, age, and depositional environment. In doing so, he included all sedimentary rocks (including sediments and metasedimentary rocks) of the Archean, Proterozoic, and Phanerozoic eons.

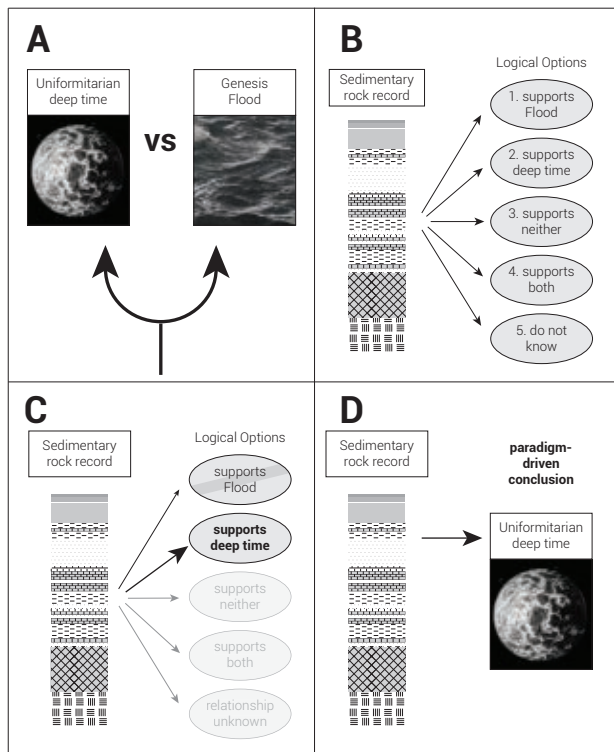


Figure 1. While stratigraphy focused on the paradigmatic debate between uniformitarianism and the Flood (A), geologists ignored the five actual logical options (B). This obscured three options, and a fourth—the possibility of a supportive relationship between the Flood and the rocks—was rejected *a priori* (C). Thus, geologists have wrongly concluded that the sedimentary rock record unilaterally supports deep time (D).

Although most Archean rocks are igneous or metamorphic in lithology, Ronov included those he deemed to have been at some time sedimentary.

The sedimentary record is marked by several interesting discontinuities. The most obvious is the disproportionately high volume on the continents and continental margins. Together, they contain 82.8% of sedimentary rocks, even though they occupy less than 42% of the total surface area. Ronov estimated Earth's total surface area to be 510,072,000 km², with a little more than 29%, or 148,940,000 km², as dry land. Of the 361,132,000 km² under water, 12.7%, or 64,779,144 km² comprised continental margins (figure 2).

After estimating the distribution of Earth's sedimentary rocks, Ronov calculated the average thickness of the sedimentary shell in a variety of crustal settings. On continents, he estimated the average thickness to be 5 km. This decreased to 2.5 km on the continental margins, and 0.4 km on the sea floor (figure 3). His averages include everything from exposed continental shields to deep basins like the Southern Caspian Basin, where the sedimentary column thickness reaches 25 km,⁷ and the western Gulf of Mexico, where it locally exceeds 16 km.⁸

Others have estimated significantly lower average thicknesses and volumes. Blatt *et al.*⁹ estimated an average thickness of 2.7 km on continents and 2.8 km on continental margins—an increase from Blatt's¹⁰ earlier estimate of 0.82 km globally, 1.82 km on the continents, and 0.24 km on the ocean floors. Nelson¹¹ reported a continental average of only 1.8 km, very similar to that of Blatt.¹⁰ One difference in these estimates may be that Ronov⁵ focused on the entire

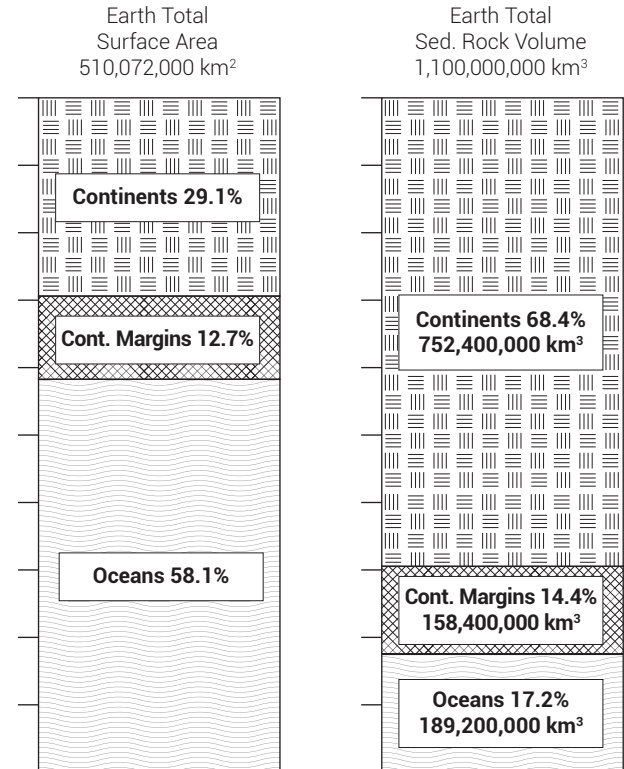


Figure 2. Oceans and submarine continental margins occupy most of Earth's surface area (left), but the bulk of Earth's sedimentary rocks occur on the continents (right), according to Ronov.⁵

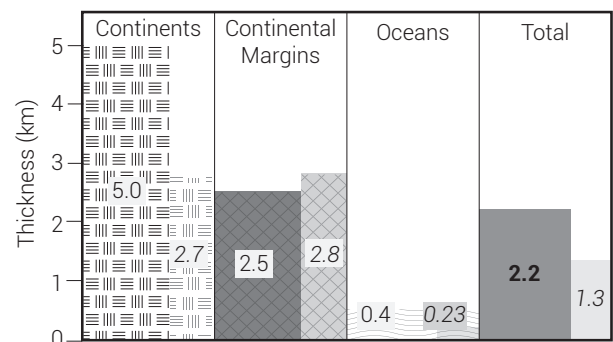


Figure 3. Comparison of calculations of Ronov⁵ and Blatt *et al.*⁹ for the average thickness of sedimentary rocks on continents, continental margins, ocean floors, and the entire planet. Ronov's estimates are shown in the darker patterns and font.

section above igneous and metamorphic basement, including metasedimentary rocks. However, the likely cause of the varying measurements is simply the difficulty of the task.

Modern sedimentation rates are too high

The second data point is the range of observed rates at which sedimentary rocks accumulate. That too can be difficult to determine, due to observational limits and because modern rates vary by up to eleven orders of magnitude.^{12,13} These processes range in magnitude from a clay particle settling in the ocean to mass wasting events, and in time from a single wave on a beach to the infilling of a large cratonic basin. Unfortunately, many ‘observed’ rates are often *inferred* rates, based on measurements of stratal thickness and dates for the base and top. This, of course, is circular—it assumes uniformitarian deposition between the deep-time dates of the top and bottom. Moreover, observations showing that much sedimentation is the result of disproportionately rare, high-energy events call into question the old gradualist model of sedimentation. Bailey and Smith¹⁴ question if there is *any* significant continuous deposition represented in the rock record, agreeing with Ager¹⁵ that there is “more gap than record”, and although Miall¹² admits that the record is a set of ‘frozen accidents’, he still affirms confidence in uniformitarian stratigraphy.

In fact, uniformitarian sedimentation rates appear to be a product of faith overcoming fact. Geologists can measure modern rates, and make good inferences about others, but these are routinely much higher than those considered ‘typical’ for geologic history. In fact, Sadler¹³ posited a power law decrease in the rate of sediment accumulation back through time because of these kinds of observations. And others¹⁶ recognize the necessity of this auxiliary hypothesis to lower ‘older’ rates. The unspoken assumption is deep time. When that condition is ignored, observed ‘high’ rates appear more normal than believed.

Sedimentation vs accumulation rates

The journey from sediment to preserved sedimentary rock involves several physical factors that can reduce the volume of freshly deposited sediment. These include compaction, dewatering, dissolution, and other diagenetic changes, such as changes in clay mineralogy. Diagenesis refers to all chemical, physical, and biological changes in sediment after deposition. In addition, large-scale physical factors, such as uplift and erosion, affect the final volume. Erosion is usually assumed to be the primary reason for the reduction in expected volume.¹⁷

Because sediment can be transported, deposited, and re-eroded and transported again relatively quickly, most geologists see *accumulation* as being most directly related to the rate of subsidence of sedimentary basins, which

produces what is called *accommodation space*. Modern sedimentation rates suggest that particles are supplied in excess of this space; the final product is a function of how much and how quickly the basin’s crust subsides to capture and preserve the sediments cycling through that area. Bailey¹⁸ referenced Smith’s¹⁹ concept of a self-organized ‘Stratigraphy Machine’ that teeters on the edge of chaos, allowing occasional preservation and accumulation of eroded waste as sedimentary rocks.

Scale creates enough complexity to obscure the basic point that there are not enough rocks. Given uniformitarian history, we will examine the gross aspects of the record in terms of what this ‘Stratigraphy Machine’ might produce over 4.5 Ga.

A shortcut: comparing a variety of rates to accumulated thicknesses

When comparing the data points of observed sedimentation rates to the global volume of the sedimentary record, we use thickness as a surrogate for volume, since most sedimentary processes produce local geometric bodies of limited volume, but measurable thickness. Before examining modern rates, we first must find a way to relate a *range* of thicknesses to a *variety* of rates. This sets boundaries, creating a theoretical template against which measured and interpreted rates can be calibrated, and by which thickness ranges for particular periods of time can be quickly matched to minimum rates.

Figure 4 shows seven hypothetical rates, ranging from 0.1 mm/1,000 years (ka) to 10,000 mm/ka. Although all rates are normalized to mm/ka, resulting thicknesses are presented in accumulated *metres* of sediment for the four left columns, and accumulated *kilometres* of sediment for the right three columns for convenience. For the same reason, headers also include conversions to cm and m.

Figure 4 shows that a rate of 0.1 mm/ka is very low and supplies a total thickness of sediment less than 0.5 km over deep time. A rate of 1 mm/ka more than doubles the 2.2 km thickness of Ronov’s ‘stratisphere’. One of 10 mm/ka would fill the South Caspian Basin in about 2.5 Ga, and once rates move into ranges of 100–10,000 mm/ka, the resulting total thickness would range up to tens of thousands of km! At a rate of 1 m/ka, the total thickness of the accumulated record would be over 4,500 km, and today’s 2.2 km average would thus represent only 0.05% of that record.

Observed rates range across this spectrum but are on average much higher than required to supply the gross rock record. High rates create problems for uniformitarian geologists, even when lower inferred rates (assuming deep time) are used. For example, Schwab²⁰ estimated rates at a variety of basins (assuming deep time) reaching into hundreds of mm/ka. Although the rates in basins are higher than those outside basins, no basin reaches the predicted tens to hundreds of km, and such thicknesses call into question

the necessary erosion or compaction needed to reduce that thickness. Sporadic accumulation, erosion, and subduction are the most common auxiliary hypotheses to explain the discrepancy, but the point is that there is a discrepancy of such magnitude to explain in the first place. That calls into question the relationship shown in figure 1D.

Although actual sedimentary processes are complex, the range of rates is sufficient to demonstrate that at any rate exceeding 1 mm/ka the present volume of sedimentary rocks represents a very small fraction of those ever deposited. This theoretical envelope helps us understand both modern rates and ancient thicknesses.

Reported sedimentation rates

Although sedimentation rates in the past cannot be measured, there are a surprising number of scientific observations and measurements of sedimentation occurring today. There are two classes of these: (1) actual observations and measurements, and (2) inferences in the ‘recent’ past based on stratigraphic methods, usually radiometric dating.

A sample of these is shown in figure 5. Some are of ongoing processes; others were unique events. However, geologists have stated that the unusual events are those most likely to be preserved—Ager¹⁵ called them ‘frozen accidents’. An additional column is included to normalize all rates to figure 4’s measurements in mm/ka. What is immediately apparent is that modern rates are *much* higher than those proposed for the past, and that actual observed rates tend to

be much higher than those that presuppose deep time and use stratigraphic methods. For example, Coleman²¹ observed crevasse splay deposits forming at rates of 300,000 mm/ka in the Mississippi delta. But, assuming they formed during the 2.5 Ma of the Pleistocene, he concluded that deltaic deposits in the Gulf of Mexico formed at ‘only’ 1,440 mm/ka.

But even rates that assume deep time are quite high, like those reported in the Mediterranean Basin by Cita *et al.*²² They calculated rates of 90–300 mm/ka for sediments below and above the Messinian ‘evaporites’ and rates of 1,000,000 mm/ka for the ‘evaporites’ themselves! Even processes assumed to be slow—like coral reef growth—are not. Based on modern observations, Roth²³ noted rates of up to 414,000 mm/ka for reefs, and Read and Snelling²⁴ thought that the Great Barrier Reef of Australia was growing at a rate of 15,300 mm/ka. Overbank flooding on the central Amazon River produced rates of over 12,000,000 mm/ka, and even assuming deep time, Kuehl *et al.*²⁵ estimated deposition on its delta was proceeding at rates up to 100,000 mm/ka.

In 1964, construction on the Aswan Dam reached the point that the river began infilling the new Lake Nasser, which reached an aerial extent of over 5,000 km². Based on the nearly 5 billion cubic metres of sediment deposited since 1964, the sedimentation rate in the lake is approximately 18,800 mm/ka. And this rate is small compared to that in Lake Mead, which, over the past 80 years, has reached nearly 250,000 mm/ka. Catastrophic events, such as the levee break in the Lower Ninth Ward of New Orleans during Hurricane Katrina,²⁶ or the lahars on the North Fork of the Toutle River after the 1980 eruption of Mount St Helens, have yielded rates in the billions of mm/ka.

Some of these are clearly unusual and highly localized events and processes, yet every modern rate is much higher than those proposed for the past. The uniformitarian principle would lead us to apply what is seen in the present to the rock record. Figure 4 shows that rates exceeding 1 m/ka would result in a complete rock record of *thousands of kilometres* in 4.5 Ga. The difference between those values and the approximated < 2 km is stark. Uniformitarian geologists claim that historical rates were lower, but it is hard to conceive of rates being several orders of

Time	Avg. thickness (m) rates = mm/1,000 years				Avg. thickness. (km) rates = mm/1,000		
	0.1	0.5	1	10 (1 cm)	100 (10 cm)	1,000 (1 m)	10,000 (10 m)
Per Ma	0.1	0.5	1	10	0.1	1	10
Per 10 Ma	1	5	10	100	1	10	100
Per 100 Ma	10	50	100	1,000	10	100	1,000
Per 500 Ma	50	250	500	5,000	50	500	5,000
Per 1 Ga	100	500	1,000	10,000 <small>Max. Earth=25km</small>	100	1,000	10,000
Per 4.55 Ga	455 ³	2,275 ¹	4,550 ²	45,500	455	4,550	45,500
Cenozoic (65.5 my)	6.6	32.8	65.5	655	6.55	65.5	655
Mesozoic (185.5 my)	18.6	92.8	185.5	1,855	18.55	185.5	1,855
Paleozoic (290 my)	29	145	290	2,900	29	290	2,900
Proterzoic (1,959 my)	196	979.5	1,959	19,590	196	1,959	19,590

Figure 4. Comparison of accumulations shown as average thicknesses for a range of sedimentation rates. Superscript notes for comparison: 1 = Earth’s average of 2,200; 2 = Continental average of 5,000 m; 3 = Ocean floor average of 400 m.⁵ Grey box in centre: Earth’s greatest known thickness of sedimentary rocks in the South Caspian Basin—a minimum of 10 mm/1,000 years for 2.5 Ga. Note that higher rates result in thicknesses far in excess of any observed rates; those of just 1 mm/year (1 m/1,000 years) result in an average of over 4,500 km, or nearly 15 million vertical feet of sedimentary rock!

Observed or Inferred Sedimentation Rate							
Location	Description	Min.	Max.	Units	Corrected to mm/ka	Ref.	Assumes deep time
Deep ocean	Red clay deposition	3	3	mm/ka	3	9	Y
Central Atlantic	Vema fracture zone	1.2		m/ka	1,200	9	Y
Mediterranean Basin	Pre-Messinian seds.	2.5	9	cm/ka	90		
Mediterranean Basin	Messinian evaporites	1,000		m/ka	1,000,000	2	Y
Mediterranean Basin	Plio-Pleistocene seds.	0.1	30	cm/ka	300	22	Y
Bahamas Platform	Carbonate platform	23		mm/ka	23	9	Y
California	Ridge basin	11		mm/ka	11	9	Y
SW South Dakota	Stock ponds (35 mm rain)	60	850	mm/ka	850,000	9	N
Rocky Mountains	Alluvial fans	0.1	1	m/ka	1,000	9	Y
California	Submarine fans	0.05	1.2	m/ka	1,200	9	Y
Mississippi Region	Clastic basin	200		mm/ka	200	9	Y
Mississippi Delta	Pleistocene Gulf of Mexico		0.00144	m/ka	1,440	21	Y
Mississippi Delta	Crevasse splays		0.3	m/ka	300,00	21	N
Mississippi River	2001 flood overbank silts	30	80	mm/wk	4,160,000	28	N
Brazil	Central Amazon floodplain	0.3	3.3	cm/day	12,045,000	29	N
Brazil	Amazon fan		25	m/ka	25,000	30	Y
Brazil	Amazon fan (interglacial)	5	10	cm/ka	100	31	Y
Brazil	Amazon fan (glacial)	1	50	m/ka	50,000	31	Y
Brazil	Amazon delta		10	cm/yr	100,000	25	Y
Swiss Alps	Molasse basin	150	400	mm/ka	400	9	Y
Coral Reefs		0.8	414	mm/yr	414,000	23	N
Max. growth rate of coral organisms							
	<i>Antipathes sp.</i>		143	mm/yr	143,000	23	N
	<i>Acropora palmata</i>		99	mm/yr	99,000	23	N
	<i>Acropora cervicornis</i>		432	mm/yr	432,00	23	N
	<i>Acropora pupucchra</i>		226	mm/yr	226,000	23	N
Australia	Great Barrier Reef		15.3	mm/yr	15,300	24	N
New Orleans, LA	Levee break (Katrina)		1.25	m/hr	10,950,000,000	26	N
Mt St Helens	Toutle River lahar		183	m/day	66,795,000,000	34	N
Indonesia	2004 tsunami	0	30	cm/hrs	876,575,000	36	N
New York	Cayuga Lake	2.4	8	mm/yr	8,000	32	Y
India	Himalayan foothills lake	1.4	3.7	mm/yr	3,700	33	Y
Nevada	Lake Mead	0	250	ft/80 yr	238,125,000	35	N
Michigan	Lake Michigan	0.04	0.28	cm/yr	2,800	34	Y
Egypt	Lake Nasser		0.94	m/50 yr	18,000	12	N
Colorado	Bijou Creek flood	1	4	m/12 hr	18,000	12	N
Texas	Rio Grande valley	16	35	cm/yr	350,000	12	N
Wabash River	Wabash River point bars		1,000	m/ka	1,000,000	12	N
Miss. River, SW Pass	Distributary bars		730	m/ka	730,000	12	N
France	Rhone River delta front		35	cm/yr	350,000	12	N
China	Yangtze River mouth		4.4	cm/mo	528,000	12	N
Vietnam	Red River mouth	10	940	m/ka	940,000		
Indian Ocean	Bengal fan		1	m/yr	1,000,000	12	N
Texas	Colorado River valley fill	0.35	1.7	m/ka	1,7000	12	Ge
Georgia	Sapelo Island tidal inlets		4.5	m/ka	4,500	12	Y
Various	Modern alluvial fans	0.08	50	m/ka	50,000	12	Y
Gulf of Mexico	Plio-Pleistocene sediments	0.16	6.45	m/ka	6,450	12	Y
Galveston Island, TX	Barrier island		3.4	m/ka	3,400	12	Y

Figure 5. Samples of modern sedimentation rates from a variety of depositional settings. ^{9,12,21–26,28–37} Note some rates were measured and others inferred for ‘recent’ history using stratigraphic methods that assume deep time. Almost all modern rates far exceed those expected for ancient sediments based on volume of strata. Measured rates are usually far higher than those that infer rates based on deep time.

magnitude lower, especially with the evidence for large, rapid deposition in the rock record. They offer a variety of explanations for the much lower volumes of historical strata,²⁷ but the fact remains that explanations are required, and that present-day observations do not approach these historical low rates, even when deep time is assumed and rates estimated in environments like the abyssal ocean floor.

Continental erosion rates and volumes: another perspective

Another way to approach the problem is to examine the rate at which sediment might be formed by erosion. Do modern erosional rates reflect elevated depositional rates, or do they align with ancient sedimentation rates? Like sedimentation rates, we will examine erosion on a gross scale and ask how much time would be needed to erode the volume of the present-day continents to sea level.

Land above sea level averages 835 m in elevation and occupies over 148 million km².³⁸ That yields a volume of nearly 124 million km³. Figure 6 shows the present relationship between land and sea in a hypsometric curve, showing the far greater volume of the world’s oceans to dry land. Only a rough calculation is possible; erosion would slow as gradient decreased and isostasy would uplift continental crust as it thinned, but geologists have provided estimates of how long it would take to erode the continents to sea level using observed rates of denudation.

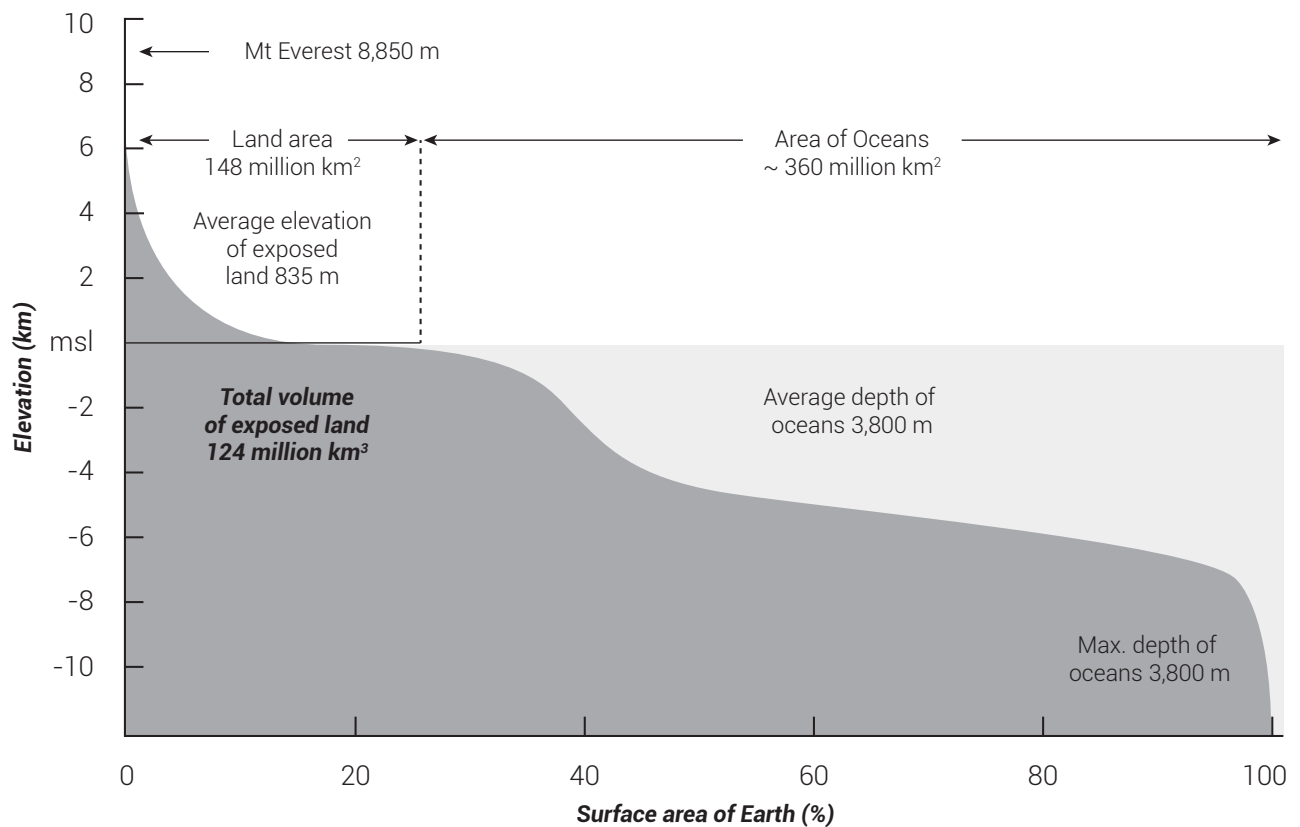


Figure 6. Hypsometric curve showing area of Earth above and below sea level. Total land area multiplied by average exposed land elevation yields average volume to be eroded of ~124 million km³.⁴¹

This, in turn, would be an estimate of how long it would take to turn 124 million km³ of crustal rock into sedimentary particles. The first step in this analysis is to examine present-day erosional rates.

Blatt *et al.*⁹ and many others have studied erosion in a variety of settings. Erosion rates depend on many variables and are difficult to estimate.^{39,40} Blatt *et al.*⁴¹ reported erosion rates ranging from 41–48 mm/ka in the Appalachians, rates ranging from 70–910 mm/ka in the Alps, and up to 720 mm/ka in the Himalayas. The erosion rate in the Himalayas has recently been calculated to be much higher.⁴² They noted that 5–10% of the continental mountainous terrain supplies 80% of erosional load; erosional rates increase with increasing slope at an exponential rate.⁴³

Chen *et al.*⁴⁴ found an average landslide erosion rate of 2,650–5,170 mm/ka for one basin in Taiwan. This is high, but represents basin erosion in a mountainous area with occasional extreme events. The Teton Mountains of northwest Wyoming provide an example of a similar modern setting with lower precipitation. Hillslope erosion was calculated at 800 mm/ka, while the basin averaged 200 mm/ka.⁴⁵ Yet all these rates are much higher than the long-term rates based on cosmogenic isotopes (which assume deep time), thought to be 20 mm/ka.

Another modern study was performed for a mountainous region with low precipitation and negligible human impact; the northeast edge of the Tibetan Plateau.⁴⁶ Over an area of 3,000 km² with a mean elevation of 4,000 m, the rate was estimated at 80 mm/ka for the arid to semi-arid region that gets most of its precipitation from summer storms. This rate incorporated all three fluvial erosional parameters: suspended load, bed load, and dissolved load, but it is still much higher than ‘long-term erosion rates’ that assume deep time.

An accurate measure of actual erosion was found by Lazzari *et al.*⁴⁷ They measured the accumulation of sediment at a dam at the exit of a basin when the reservoir in southern Italy was drained. The basin has medium to high relief, and landslides are the dominant erosional mechanism. This study provides a representative rate for the Mediterranean area. Based on 38 years of storage and assuming a density of 2.5 g/cm³ for the eroded rock, their erosion rate was 645 mm/ka. A variety of erosion rates are shown in figure 7.

If we apply the minimum rate of Blatt *et al.*⁴¹ of approximately 40 mm/ka to the average continental elevation of 835 m, the total volume would be gone in a little more than 21 Ma. This corresponds to estimates of scientists who have calculated that complete denudation would take between 10 and 50 Ma. Roth⁴⁸ evaluated similar

estimates and assumed total denudation within 10 Ma. His estimate was based on the quantity of suspended load in rivers flowing into the ocean.⁴⁹ Other variables could change these estimates. Human activity seems to have increased erosion, but that contribution to the suspended load deposited on deltas is unknown, since dams restrain erosion. Even if human activity has halved the natural erosion rate, the time needed to completely erode the continental volume remains at only 20 Ma. This does not account for bedload and dissolved load entering the oceans or for coastal erosion. Discharge during floods—which account for the bulk of sediment transported—is often not measured.⁵⁰ Unknown variables could increase erosion. On the other hand, the decreasing gradient would significantly decrease the erosion rate. If we use elevated rates shown in figure 7, such as hundreds of mm/ka, the time needed to erode the continents could be as little as one million years. Isostatic and tectonic uplift would offset the decrease in rate from the decrease in gradient. At any rate, the maximum feasible erosion rate of the continents' volume would be less than 50 Ma.

Continental crust has an average density of 2.7 g/cm³. Sedimentary rocks have lower average densities, due to space occupied by porosity as a function of grain packing, and to differences in mineralogy. For that reason, the minimum amount of sediment derived from the 124 million km³ of continental crust would be at least the same, and most likely greater, ignoring chemical dissolution and precipitation. While rocks can be changed from one type to another, their matter cannot simply appear or disappear. Therefore, continental denudation would yield a minimum of 124 million km³ of sedimentary rock.

If we assume Ronov's⁵ estimate of the volume of the global sedimentary record of 1,100 million km³, then the 124 million km³ from today's continents would yield about 11% of the total sedimentary record, and would thus require nine episodes of uplift and denudation to produce the global sedimentary rock record. Given Roth's

rate of 10 Ma,⁵¹ it would then take 90 Ma to reproduce the volume of the rock record. At a slower rate of 50 Ma, it would take 450 Ma to reproduce the rock record. These are estimates *based on uniformitarianism*—the extrapolation of present-day processes and their rates. This principle is what geologists continue to assert as their fundamental principle.¹² Earth's sedimentary rocks could then have formed in as little as 2% of deep time or as much as 10%.

Observed or Inferred Sedimentation Rate						
Location	Description	Min.	Max.	Units	Ref.	Assumes deep time
Appalachian Mtns		41	48	mm/ka	9	Y
Mississippi River		43		mm/ka	9	Y
Alps		70	910	mm/ka	9	Y
Himalayas			720	mm/ka	9	Y
Southern Africa			77	mm/ka	54	N
Amazon	River drainage basin		93	mm/ka	53	N
Amur	River drainage basin		93	mm/ka	53	N
Brahmaputra	River drainage basin		688	mm/ka	53	N
Chiang Jiang	River drainage basin		131	mm/ka	53	N
Colorado	River drainage basin		96	mm/ka	53	N
Columbia	River drainage basin		52	mm/ka	53	N
Danube	River drainage basin		93	mm/ka	53	N
Dnieper	River drainage basin		5	mm/ka	53	N
Ganges	River drainage basin		273	mm/ka	53	N
Huang He	River drainage basin		54	mm/ka	53	N
Indus	River drainage basin		136	mm/ka	53	N
Southern Italy	Mountain basin		645	mm/ka	48	N
Kolyma	River drainage basin		4	mm/ka	53	N
La Plata (Parana)	River drainage basin		14	mm/ka	53	N
Lena	River drainage basin		11	mm/ka	53	N
MacKenzie	River drainage basin		32	mm/ka	53	N
Mekong	River drainage basin		99	mm/ka	53	N
Mississippi	River drainage basin		77	mm/ka	53	N
Murray	River drainage basin		13	mm/ka	53	N
Niger	River drainage basin		8	mm/ka	53	N
Nile	River drainage basin		11	mm/ka	53	N
Ob	River drainage basin		6	mm/ka	53	N
Orange	River drainage basin		28	mm/ka	53	N
Orinoco	River drainage basin		75	mm/ka	53	N
Rio Grande	River drainage basin		19	mm/ka	53	N
Shatt El-Arab	River drainage basin		26	mm/ka	53	N
St. Lawrence	River drainage basin		14	mm/ka	53	N
Taiwan	Mountain basin, hi precip	2,650	5,170	mm/ka	46	N
Tetons, Wyoming	Mountain basin, med predip		200	mm/ka	47	N
Tibetan Plateau	Mountain basin, lo precip		80	mm/ka	41	N
Yenisei	River drainage basin		9	mm/ka	53	N
Yukon	River drainage basin		44	mm/ka	53	N
Zaire	River drainage basin		7	mm/ka	53	N
Zambezi	River drainage basin		15	mm/ka	53	N

Figure 7. Modern erosion rates from a variety of settings.^{9,46–49,51,52} Some are inferred using the assumption of deep time; others are measured or inferred independent of deep time.

Either way, erosion rates indicate that only a fraction of deep time would be needed to produce the rock record.

Discussion: the sedimentary record and time

Since the earliest days of geology, the sedimentary rock record has been viewed from the perspective of its purported incompatibility with the Genesis Flood. Geologists claimed that the volume of rock was too great to have been deposited in a year-long flood, but then drew the flawed conclusion that if the sedimentary record does not support the Flood, it automatically supports uniformitarian deep time (figure 1). That was a case of belief driving interpretation. The inherent circular reasoning in that train of thought remains an unacknowledged flaw of ‘historical science’.

Geologists have become so accustomed to arguing in this circle that they rarely, if ever, re-examine their assumptions. If one assumes uniformitarian history, then one will automatically conclude that the sedimentary record ‘proves’ uniformitarianism, and the circle perpetuates itself. This circular reasoning is evident at all scales; even calculations of rates based on a measured thickness and stratigraphic ages of the top and base show this flaw. Schwab²⁰ compared depositional rates of 75 basins, but in every case he *derived* rates from a thicknesses/time calculation that assumed uniformitarian history. Needless to say, his ‘rates’ were much lower than those observed today.

Furthermore, the uniformitarian method assumes gradual slow deposition and often ignores field realities. Reed⁵³ showed how this kind of ‘rate’ calculation could not explain field features of basalt flows at the Midcontinent Rift System. Supposedly, these flows took more than 21 Ma to form, but the physical constraints on the flows and the sizes of their vents indicate actual emplacement of each flow in hours, similar to those of the Columbia River Basalt. In Kansas, the basalt flows—the actual rock record—would require ~120,000 years of ‘dead time’ between each flow in order to reach the assumed 21 Ma. And yet all evidence of erosion between subsequent layers is lacking to support that ‘dead time’. The basalts are merely flow atop flow. More than 99.99% of deep time is thus unrecorded by the actual rock record in that case.

In similar cases, where thick sections of sedimentary rock formed quickly or where the bulk of the stratigraphic section is composed of hiatuses, the same problem occurs. And these sedimentary layers also show little, if any, evidence of erosion between one layer and the next. The physical evidence to support the claims of deep time between the layers is missing, just like between the lava flows described above.

Geologists, committed to uniformitarian deep time, thus demonstrate themselves to be dogmatists, not empiricists.

Clues to that dogmatism were manifested early on, with an unwavering support for deep time, even when its quantity was increasing by *orders of magnitude* between the mid-18th to mid-20th century. Buffon challenged biblical history with a 75,000-year-old Earth. Werner thought it over a million, and Kant, in 1790, estimated many millions of years.⁵⁴ In 1860, John Phillips placed the base of the Cambrian at 96 Ma and Darwin estimated that natural selection would require a billion years to produce the tree of life. Kelvin restrained these speculations with physical calculations that ranged down from 400 Ma in 1863 to 24 Ma in 1897. But Holmes (1913) used a radiometric geochronology to set Earth’s age at 1.6 Ga, and Claire Patterson calculated the current accepted date of 4.55 Ga in 1953.⁵⁵ Even though the jump from Buffon to Patterson was nearly four orders of magnitude, stratigraphers were always able to reconcile that remarkable range of ages with uniformitarian sedimentation, simply because their frame of reference was ‘anything but the Bible’. The stratisphere⁵ was shoehorned into tens of thousands of years and then stretched to fit billions, all the while telling the same story—no Flood. If today’s sedimentary record is supposed to illustrate billions of years, those earlier accommodations were impossible, and thus the original reasons for rejecting the Flood are shown to have been subjective and flawed.

In evaluating the relationship between the sedimentary rock record and Earth’s past, the hard data available are limited to estimates of the total volume of Earth’s sedimentary rocks and observed sedimentation rates. The severe disjunction between these two empirical data points yields one inescapable conclusion—*there are far fewer sedimentary rocks on Earth than should have been deposited over 4.5 Ga*. Uniformitarian geologists facing this reality have only bad options to explain the discrepancy. One is higher rates on a younger Earth. That is unacceptable. The other, and most commonly used, is that the record is mostly missing sections, thanks to erosion. However, the unintended consequence of this solution creates the question-begging scenario of an unrepresentative record. That strikes a blow at the heart of the idea that earth history is known with scientific certainty. The only other option would be for geologists to accept the discrepancy between rates and volume as an indication that their core method of actualism is wrong.

Attempts to work around this problem abound, although many geologists like Ager¹⁵ simply seemed to accept it as a feature of the rocks and ignore the consequences. Others are more concerned and advance explanations. Rocks were eroded.¹³ Rocks were subducted. Rocks did not have sufficient accommodation space, or sediment accumulation rates have increased over time.¹² Rates today are anomalously high. Any or all may be correct, but all these

ideas reason in a circle, refuse to consider the possibility that the assumptions of deep time and uniformitarianism might be the problem, and argue from a lack of evidence, thanks to the fact that most of Earth's history is written on the blank pages of hiatuses in the record.

Before evaluating any of these hypotheses, it is first essential to understand the role of the assumptions that drive them. The stated bedrock of modern geology is the actualistic method of uniformitarianism, but more often than not that assumption is a hindrance because modern geological environments are not good analogs for the rock record. Auxiliary hypotheses are tools such geologists use to *work around* actualism, not use it. This demonstrates that the real bedrock of modern geology is negative—it is a convoluted attempt to dismiss divine providence from history, beginning with the Genesis Flood.

The volume of the sedimentary record does not support the 4.5 Ga of uniformitarian geology. Because these geologists have historically been fixated on the relationship between the volume of rocks and their estimates of what could be deposited during the Flood, they are belatedly realizing that the rock record is not kind to uniformitarianism. Since diluvialists are not similarly constrained by actualism or by pristine empiricism, one could argue that the rock record is *much less kind* to uniformitarianism than to diluvialism. For the purposes of this paper, however, it does not matter whether the Genesis Flood can explain the rocks. The issue before us is that uniformitarianism cannot. If the rocks justify only a small part of history, then the history of secular geology cannot possess the certainty assigned to it. Forensic confidence in the rock and fossil records is therefore misplaced. Absent the revelatory record of the Bible, uniformitarian geologists—advocates of empiricism and actualism—are left with data that convey very little about the past. Ironically, geologists who are quite comfortable *lowering* observed rates to justify their uniformitarianism are completely unwilling to consider *higher* rates and larger scales associated with the Flood, even though the logic is the same.

Conclusion

Geologists since the 18th century have argued that the sedimentary rock record supports their paradigm of uniformitarian deep time because there are 'too many rocks' for the one year Flood. But the triumph of deep time was premature; it masked the fact that the sedimentary rock record does not support uniformitarian history. The gross volume of Earth's sedimentary rocks is not supported by the sedimentation rates observed in the present. At the most fundamental level, the gap between the sedimentary record and the proposed 4.5 Ga history of our planet suggests that

either the actualistic principle is not a good method or that the volume of sediments on Earth was produced in much less than 4.5 Ga. That leads to two unpalatable options for uniformitarian geologists: (1) that Earth is much younger than 4.5 Ga, or (2) that the existing record is not representative of the past. The rock record constitutes a very poor forensic buttress for uniformitarianism. Consequently, the fossil record contained in these rocks is likewise deficient and is an equally poor support for evolutionary history. Stratigraphic methods that assume gradual and continuous sedimentation, like cyclostratigraphy, are also in trouble. The supposed happy marriage between uniformitarian deep time and the sedimentary record is in more trouble than people think.

References

1. 'Secondary' was the term introduced by Arduino to describe indurated sedimentary rocks of the Southern Alps.
2. Rudwick, M.J.S., *Bursting the Limits of Time: The reconstruction of geohistory in the age of revolution*, University of Chicago Press, Chicago, IL, p. 123, 2005.
3. Reed, J.K. and Oard, M.J., Three early arguments for deep time, part III: the sedimentary record, *J. Creation* 26(2):100–109, 2012.
4. Young, D.A. and Stearley, R.F., *The Bible, Rocks and Time: Geological evidence for the age of the earth*, IVP Academic, Downers Grove, IL, p. 378, 2008.
5. Ronov, A.B., *The Earth's Sedimentary Shell*, American Geological Institute Reprint Series 5, Falls Church, VA, 1983.
6. E.g. Boggs, S., *Petrology of Sedimentary Rocks*, 2nd edn, Cambridge University Press, Cambridge, UK, 2009.
7. Priestley, K., Patton, H.J., and Schultz, C.A., Modeling anomalous surface-wave propagation across the Southern Caspian Basin, *Bulletin of the Seismological Society of America* 91(6):1924–1929, 2001.
8. Carroll, A.R., *Geofuels: Energy and the earth*, Cambridge University Press, New York, 2015.
9. Blatt, H., Middleton, G., and Murray, R., *Origin of Sedimentary Rocks*, Prentice-Hall, Inc., Englewood Cliffs, NJ, 1980.
10. Blatt, H., Determination of mean sediment thickness in the crust: a sedimentologic method, *Geological Society of America Bulletin* 81: 255–262, 1970.
11. Nelson, S.A., Occurrence, Mineralogy, Textures, and Structures of Sedimentary Rocks, www.tulane.edu/~sanelson/geol212/sedrxintro.htm, 18 April 2013.
12. Miall, A.D., Updating Uniformitarianism: Stratigraphy as just a set of 'Frozen Accidents', in: Smith, D.G., Bailey, R.J., Burgess, P.M., and Fraser, A.J. (Eds.), *Strata and Time: Probing the gaps in our understanding*, Special Publication 404, Geological Society, London, 2015.
13. Sadler, P.M., Sediment accumulation rates and the completeness of stratigraphic sections, *The J. Geology* 89(5):569–584, 1981.
14. Bailey, R.J. and Smith, D.G., Scaling in stratigraphic data series: implications for practical stratigraphy, *First Break* 10:57–66, 2010.
15. Ager, D.V., *The Nature of the Stratigraphical Record*, John Wiley and Sons, New York, 1973.
16. E.g. Miall, ref. 12, and Bailey and Smith, ref. 14.
17. E.g. Miall, ref. 12, Sadler, ref. 13, and Bailey and Smith, ref. 14.
18. Bailey, R.J., Review: Stratigraphy, meta-stratigraphy, and chaos, *Terra Nova* 10: 222–230, 1998.
19. Smith, D.G., Cyclicity or chaos? Orbital forcing versus non-linear dynamics; in: De Boer, P.L. and Smith, D.G. (Eds.), *Orbital Forcing and Cyclic Sequences*, International Association of Sedimentologists Special Publication 19, pp. 531–544, 1994.
20. Schwab, F.L., Modern and ancient sedimentary basins: comparative sedimentation rates, *Geology* 4:723–727, 1976.
21. Coleman, J., Dynamic changes and processes in the Mississippi River delta, *Geological Society of America Bulletin* 100(7):999–1015, 1990.

22. Cita, M.B., Ryan, W.B.F., and Kidd, R.B., Sedimentation rates in Neogene deep-sea sediments from the Mediterranean and geodynamic implications of their changes, *Deep Sea Drilling Project* **42**(1):991–1002, 1978.
23. Roth, A., *Origins: Linking Science and Scripture*, Hagerstown, MD, 1998.
24. Read, P. and Snelling, A., How old is Australia's Great Barrier Reef? *Creation* **8**(1): 6–9, 1985.
25. Kuehl, S.A., DeMaster, D.J., and Nittrouer, C.A., Nature of sediment accumulation on the Amazon continental shelf, *Continental Shelf Research* **6**(1–2): 209–225, 1986.
26. Barnhart, W.R., Hurricane Katrina splay deposits: hydrodynamic constraints on hyperconcentrated sedimentation and implications for the rock record, *Creation Research Society Quarterly* **41**:123–146, 2011.
27. E.g. Miall, ref. 12.
28. Julien, P.Y. and Vensel, C.W., Review of sedimentation issues on the Mississippi River. Draft Report Presented to the UNESCO-ISI, 2005; www.engr.colostate.edu/~pierre/ce_old/Projects/linkfiles/Mississippi-05.pdf.
29. Mertes, L.A.K., Rates of flood-plain sedimentation on the central Amazon River, *Geology* **22**:171–174, 1994.
30. Flood, R.D. and Piper, D.J.W., Amazon fan sedimentation: the relationship to equatorial climate change, continental denudation, and sea-level fluctuations; in: Flood, R.D., Piper, D.J.W., Klaus, A., and Peterson, L.C. (Eds.), *Proceedings of the Ocean Drilling Program, Scientific Results* 155, College Station, TX, 1997.
31. Maslin, M.A., Review of the timing and causes of the Amazon-Fan mass transport and avulsion deposits during the latest Pleistocene; in: *External Controls on Deep-Water Depositional Systems*, SEPM Special Publication No. 92, Tulsa, OK, pp. 133–144, 2009.
32. Yager, R., Estimating sedimentation rates in Cayuga Lake, New York from sediment profiles of ^{137}Cs and ^{210}Pb activity; in: Wagenet, L.P., Eckhardt, D.A.V., Hairston Jr, N.G., Karig, D.E., and Yager, R. (Eds.), *A Symposium on Environmental Research in the Cayuga Lake Watershed*, Cornell University, Ithaca, NY, pp. 78–102, 1999.
33. Rai, S.P., Kumar, V., and Kumar, B., Sedimentation rate and pattern of a Himalayan foothill lake using ^{137}Cs and ^{210}Pb , *Hydrological Sciences J.* **52**(1): 181–191, 2007.
34. Robbins, J.A. and Edgington, D.N., Determination of recent sedimentation rates in Lake Michigan using Pb-210 and Cs-137, *Geochimica et Cosmochimica Acta* **39**:285–304, 1975.
35. National Park Service, Sedimentation Lake Mead, www.nps.gov/lake/learn/nature/sedimentation-lake-mead.htm, accessed 13 February 2017.
36. Choowong, M., Murakoshi, N., Hisada, K., Charusiri, P., Daoerk, V., Charoentitirat, T., Chutakositkanon, V., Jankaew, K., and Kanjanpayont, P., Erosion and deposition by the 2004 Indian Ocean tsunami in Phuket and Phang-nga provinces, Thailand, *J. Coastal Research* **23**(5):1270–1276, 2007.
37. Morris, J.A. and S.A. Austin, *Footprints in the Ash: The explosive story of Mount St Helens*, Master Books, Green Forest, AR, 2003.
38. Whitehead, J.A. and Clift, P.D., Continent elevation, mountains, and erosion: Freeboard implications, *J. Geophysical Research* **114**:B05410, doi:10.1029/2008JB006176, 2009.
39. Milliman, J.D. and Syvitski, J.P.M., Geomorphic/tectonic control of sediment discharge to the ocean: the importance of small mountainous rivers, *The J. Geology* **100**:525–544, 1992.
40. Syvitski, J.P.H. and Milliman, J.D., Geology, geography, and humans battle for dominance over the delivery of fluvial sediments to the coastal ocean, *The J. Geology* **115**(1):1–19, 2007.
41. Blatt *et al.*, ref. 9, p. 23.
42. Lavé, J. and Avouac, J.P., Fluvial incision and tectonic uplift across the Himalayas of central Nepal, *J. Geophysical Research* **106**(B11):26, 561–26,591, 2001.
43. Kirchner, J.W. and Ferrier, K.L., Mainly in the plain, *Nature* **495**: 319–320, 2013.
44. Chen, U.-C., Change, K.-T., Lee, H.-Y., and Chiang, S.-H., Average landslide erosion rates at the watershed scale in southern Taiwan estimated from magnitude and frequency of rainfall, *Geomorphology* **228**:756–764, 2015.
45. Tranel, L.M., Spotila, J.A., Binnie, S.A., and Freeman, S.P.H.T., Quantifying variable erosion rates to understand the coupling of surface processes in the Teton Range, Wyoming, *Geomorphology* **228**:409–420, 2015.
46. Yizhou, W., Huiping, Z., Dewen, Z., Wenjun, Z., Zhuqi, Z., Weitao, W., and Jingxing, Y., Controls on decadal erosion rates in Qilian Shan: Re-evaluation and new insights into landscape evolution in north-east Tibet, *Geomorphology* **223**: 117–128, 2014.
47. Lazzari, M., Gioia, D., Piccarreta, M., Danese, M., and Lanorte, A., Sediment yield and erosion rate estimation in the mountain catchments of the Camastra artificial reservoir (Southern Italy): a comparison between different empirical methods, *Cadina* **125**:323–339, 2015.
48. Roth, ref. 23, p. 263.
49. Milliman, J.D. and Meade, R.H., World-wide delivery of river sediment to the oceans, *J. Geology* **91**:1–21, 1983.
50. Jansson, M.B., A global survey of sediment yield, *Geografiska Annaler* **70A**(1–2): 81–98, 1988.
51. Summerfield, M.A. and Hulton, N.J., Natural controls of fluvial denudation rates in major world drainage basins, *J. Geophysical Research* **99**(B7): 13871–13883, 1994.
52. Summerfield, M.A., Sub-aerial denudation of passive margins: regional elevation versus local relief models, *Earth and Planetary Science Letters* **102**: 460–469, 1991.
53. Reed, J.K., *The North American Midcontinent Rift System: An Interpretation within the Biblical Worldview*, Creation Research Society Books, Chino Valley, AZ, 2000.
54. Rudwick, ref. 2, p. 124–129.
55. Rudwick, M.J.S., *Earth's Deep History: How it was Discovered and Why it Matters*, University of Chicago Press, Chicago, IL, 2014.

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The irreducibly complex ribosome is a unique creation in the three domains of life

Matyas Cserhati and Warren Shipton

The evolution of the genetic code and the ribosome are intimately connected as the code is expressed through ribosomal activity. Models of genetic code evolution are analyzed. The error-minimization theory is faulty in that it supposes that highly error-prone genetic codes could produce more precise codes over time. The stereochemical theory posits complementarity between nucleotides and amino acids, but cannot demonstrate this for the whole code. The co-evolution theory states that the genetic code developed from an ancestral through an ancient to a modern state. There is no evidence for ancestral code protein generation. The big question remains why the code solidified in its present state. Finally, the accretion theory of ribosomal evolution is shown incapable of answering key questions.

Large and small subunit ribosome proteins are conserved within Archaea, Bacteria, and Eukarya but not between these domains. The size and weight of the subunit proteins are similar between Archaea and Bacteria only, whereas protein types are similar only between Archaea and Eukarya. This implies that the ribosome of all three domains has been created uniquely. The presence of many unique proteins and protein domains in the mitochondrial and chloroplast ribosomal proteins imply that they are not related to prokaryotic ones.

Protein synthesis is a fundamental function in the cell that involves ribosomes. The process involves first the transcription of the DNA sequence to messenger RNA (mRNA). Each sequence of three bases in mRNA is known as a codon. The information contained in the codon is used to produce functional proteins, as each codon specifies a particular amino acid. The vital step in protein formation occurs on the ribosomes with the cooperation of transfer RNA (tRNA) using ribosomal RNA (rRNA) as a binding site. It is evident that ribosomes are prerequisites to the life of the cell in that they convert genetic information into functional proteins. These structures consist of two different sized subunits, whose size is described in terms of Svedberg units (S), which is a measure of the sedimentation rate. Ribosomal proteins dominate these subunit structures, but there are up to 120 different molecules involved: rRNA, mRNAs, tRNAs, ribosomal proteins, aminoacyl-synthetases, and scanning factors. They are all needed to fulfil this basic, yet highly complex cellular housekeeping function. Besides histones (DNA packaging proteins in eukaryotes), ribosomal proteins are the most conserved proteins in the living world.¹

The coupling of the protein-translation machinery to the DNA is fulfilled in the genetic code, which consists of four nucleotide bases arranged in groups of three (codon). The codons can be arranged in 64 combinations allowing selection of the 20 amino acids; special codons mark the start and stop point for a protein. Some evolutionists believe that the ribosomes came into being before cellular life and represent the first self-replicating entities. This means the ribosomal RNA they carry is a primitive genome.²

Here we will take a look at one of the greatest problems in biology. Classically, living systems produce copies of themselves. In ancestral systems, evolutionists consider that the descendants were different from their immediate ancestor as they needed to generate coding rules that then went on to evolve new systems.^{3,4}

Evolutionary theories on the genetic code and the origin of the ribosome

There are up to 22 small ribosomal subunits in *Escherichia coli*, and up to 35 large subunit (LSU) proteins,⁵ whereas there are 33 small subunit (SSU) proteins in the human ribosome, compared to 47–48 proteins in the LSU. Across the eukaryotes, the number of ribosome proteins may not be constant.⁶ An added complication is that 70S ribosomes are found associated with the plastids (some eukaryotes). Whereas there are similarities in the 70S ribosomes between prokaryotes and eukaryotes, in the machinery associated with translation there are fundamental differences.⁷ Other ribosome types have been found in the mitochondria that show many differences in contrast to bacterial ribosomes.⁸

Our focus is on the evolution of the genetic code and the classical 70S prokaryote and 80S eukaryote ribosomes. It is a paradox of evolution that the composition of the prokaryotic ribosome is different to that of the eukaryotic one, yet the ribosome has supposedly evolved through a number of intermediary steps *back into a ribosome*. Evolution simply loses all meaning if a protein or set of proteins evolves into

a structure, which fulfils the same purpose, which it started out from.

Today there are three major theories on the origin of the genetic code:^{4,9} the error-minimalization theory,¹⁰ the stereochemical theory,¹¹ and the co-evolution theory.¹² The recently enunciated accretion theory of ribosomal evolution assumes that the genetic code is also evolving since it supposedly accounts for rRNA, mRNA as well as tRNA changes.¹³ Other theories have been proposed,^{4,14,15} but these are not discussed except for the accretion model.

The error-minimization or adaptation theory

According to Sonneborn's argument reviewed by Carl Woese,¹⁰ selection pressure acted on a primitive genetic code that led to the generation of a mature genetic code where mutations in codons produced few adverse outcomes in terms of functional proteins. This represents an error-minimization strategy. Woese admitted that the error-minimization scheme involved innumerable "trials and errors" so that it, in his opinion, "could never have evolved in this way".

Others have defended the theory. Some ingenious ideas were admitted subsequently as "utterly wrong". Interestingly, one investigation of the theoretical susceptibility of a million randomly generated codes to errors, through mutations, showed that the standard genetic code was among the least prone to error.¹⁶ This indicated that, if the initial genetic code was primitive and error prone, then what is observed in nature is the best option. However, the question remains as to why only one single code survived. Why not several different ones? This rather stands as evidence that the Creator made a wise choice.

The ancestral translational machinery conceived in evolutionary schemes is, of necessity, very rudimentary, and thus highly prone to errors. This means that it would have been almost impossible to correctly translate any mRNA, and thus produced little more than statistical proteins (proteins with only random sequences). Yet through necessity, somehow, the codons of the ancestral code were gradually reconfigured in order to minimize translational error.⁴ The 'somehow' has been imagined as perhaps involving novel amino acids, existence of a positive feedback mechanism that would assign codons to amino acids with similar properties, direct templating between nucleic and amino acids, or other possibilities.¹⁶

Vetsigian and Woese¹⁷ subsequently proposed that horizontal gene transfer (HGT) could possibly spread workable genetic workable codes across organisms, accounting for the near universality of the genetic code. However, HGT requires that the genetic codes of the host and the recipient species be similar enough for the new genetic code to work. There also needs to be evidence for

a mechanism permitting transfer of genetic information in the ancient past.

The theory naturally cannot carry much weight, since if the translation machinery is so error-prone to begin with, no meaningful proteins can come from such a configuration. Errors only lead to more errors, not higher precision, which requires intelligent input. From a thermodynamic viewpoint, disorder only increases as mutations accrue.

The stereochemical theory

Over the past 60 years, several theories have been set forward which attempt to explain how information in the DNA translates to protein sequences. These are based on some sort of selective stereochemical complementarity or affinity between amino acids and nucleotides (base pair triplets). On a physico-chemical level, this is based on the negative charges of the nucleotide phosphates interacting with the positive charge of the basic amino acids. In Saxinger *et al.*'s study no conclusive selective binding occurred between certain amino acids and nucleotide triplets.¹⁸ More recently, Yarus *et al.*¹⁹ contended that coding triplets arose as essential parts of RNA-like amino acid-binding sites, but they could show this for only seven of the 20 (35%) canonical amino acids. However, they conceded that the code can change.

The take home implication is that different amino acids can be bound by different coding triplets, meaning that the code is not specific and thus meaningless historically. Overall, after decades of research, no evidence has been found which gives strong support to the stereochemical theory. Yarus's group¹⁹ went on to argue that adaptation, stereochemical features and co-evolutionary changes were compatible and perhaps necessary in order to account for present codon characteristics. However, Barbieri³ has argued that there is "no real evidence in favour" of the stereochemical theory. This serves to illustrate the uncertainty prevailing.

The co-evolution theory

According to the co-evolution theory, the original genetic code was "excessively degenerate" meaning it could code for several amino acids. These originals were used in "inventive biosynthetic processes" to synthesize the other amino acids. The code then adapted to accommodate these new amino acids.²⁰ Similarities in the codons of related amino acids were subject to computer analysis in order to determine if a better code could be found based on biosynthetically related amino acids. An extraordinary correlation was noted for the universal code, as against 32,000 randomly generated possibilities. Changing the pattern of relatedness among amino acids gave more codes equal to or of greater correlations than the universal code. However, the authors

stated that these observations “cannot be used as proof for the biosynthetic theory of the genetic code”.²¹

Less than half of the 20 canonical amino acids found in proteins can be synthesized from inorganic molecules.³ Furthermore, the amino acids that are missing (the so-called secondary amino acids) are also missing from material recovered from meteorites.²² This is problematic for evolution, for it implies that early life-forms on this planet could only use ten amino acids for protein construction, something which we don’t observe today, thereby greatly reducing the possible number of functional proteins.

The primary amino acids were coded by an ancestral genetic code, which then expanded to include all 20 canonical amino acids. The present code is a non-random structure yet it is more robust as far as translational errors are concerned than the majority of alternative codes that can be generated conceptually according to accepted evolutionary trajectories. When the starting assumptions are altered so that the postulated codes start from an advantaged position, then higher levels of robustness are achieved. A better code could have been produced if evolution had continued, but it did not as the possibility of severe adverse effects was too great.²³ This process can be seen in figure 1.

Several questions present themselves here, however. Why don’t we find any protein sequences in the fossils of ancient organisms, which only have primary amino acids? The fact that no such proteins exist is strong proof against the evolutionary origin of the genetic code. We only find proteins made up of all 20 amino acids. Why didn’t the genetic code keep on expanding to cover more than 20 amino acids? Why not 39, 48 or 62? Why did codon triplets evolve, and why not quadruplets? With $4^4 = 256$ possible codon quadruplets, coding space could have increased, and thus a much larger universe of possible proteins could have been made possible.

An additional fundamental issue is that if life commenced in an RNA world, then amino acids could have been synthesized on the primitive codons associated with these

molecules by primordial synthetases. How do similar coding rules now apply when codon recognition is performed by the anticodons of the tRNA with the assistance of the highly specific aminoacyl-tRNA-synthetases that attach to the amino acids? It has been suggested that perhaps there was a two-base code rather than a three-base one on account of the supposed limited number of amino acids available.^{4,24}

The accretion model of ribosomal evolution

The accretion model of ribosomal evolution^{13,25} is one of the most recent models and describes how the ribosome evolves from simple RNA and protein elements into an organelle complex in six major phases through accretion, recursively adding, iterative processes, subsuming and freezing segments of the rRNA. It is argued that the record of changes is held in rRNA secondary and three-dimensional structures. Patterns observed in extant rRNA found among organisms were used to generate rules supposedly governing the changes.

First, it is assumed that evolution occurred with changes moving from prokaryotes leading finally to the eukaryotes and with the apex reached with humans. Using this framework, a chronological sequence was constructed of rRNA segment additions to the core structure found in *Escherichia coli*. The six-phase process envisaged provided no evidence for the emergence of ancestral RNA. The proto-mRNA is seen simply as arising from a random population of appropriate molecules. This proto-mRNA together with tRNA, formed through condensation of a cysteine: cysteine: alanine (CCA) sequence unit, gave rise to base-pair coding triplets (codons). The ribosomal units (small and large) are considered to have arisen from loops of the rRNA. The proposed RNA loops were ‘defect-laden’, which required a protection mechanism. During phase 2 the large ribosomal unit is thought of as a crude ribozyme almost as soon as it was a recognizable structure, catalyzing nonspecific, non-coded condensation of amino acids. Finally, the two developing ribosome units came together (phase 4) to form

a complex structure recognizable as a ribosome. In the next phase (5), specific interactions began to occur between anticodons in tRNA and mRNA codons to produce functional proteins. In the final phase the genetic code was optimized.¹³

This narrative suffers from major flaws, some of which also are inherent in previous models of the genetic code generation. No organisms have been found that contain ribosomes in any of these intermediary phases. If these intermediary phases are capable of

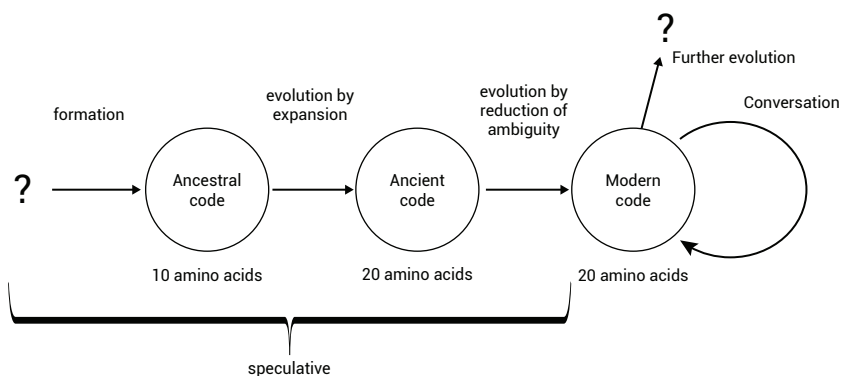


Figure 1. Different steps in the evolution of the genetic code according to the co-evolution theory

ribosomal function, then why was it necessary to evolve further during additional steps? An insistent problem is how a genetic code could be generated that depends for its expression on proteins that can only be formed when it exists. Petrov *et al.*²⁵ proposed a partial solution. The peptidyl transferase (enzyme) centre, an essential component of the ribosome, arose from an rRNA fragment. This means that its origin is conceived of as being in the RNA world.²⁶ The peptidyl transferase centre is the place in the 50S LSU where peptide bond synthesis occurs. The machinery is very complex in extant organisms. In its original incarnation, the embryonic centre was less than 100 nucleotides long. The original RNA world quickly morphed into the familiar RNA/protein world. This argument is necessary as it “has proven experimentally difficult to achieve” a self-replicating RNA system. In a revealing aside, Fox even suggested that perhaps it is not necessary to validate the existence of the RNA world if it had a short life.²⁶

Some of the additional problems with an RNA world origin were noted by Strobel.²⁷ An RNA commencement to life on Earth rests on the ability of RNA to both share the task of encoding and also to replicate information. This proposition depends on the abilities of RNA copying enzymes (ribozymes). However, such enzymes are unable to copy long templates and at a sufficient rate to overtake decomposition processes. Even greater issues are that there is no sensible resolution to the question of the origin of the activated nucleotides through abiotic processes needed for RNA formation, or of the problem as to how randomly assembled nucleotides achieved the ability to replicate. This has led some to conclude that “the model does not appear to be very plausible”. Nevertheless, undaunted, other possibilities have been invented.²⁸

The irreducibly complex character and conservation of the ribosome

The foregoing discussion leads us to conclude that the ribosome in itself is an irreducibly complex cellular organelle, requiring several dozen proteins to be present at the same time in order for it to work. Furthermore, the molecular machinery that regulates ribosomal gene co-expression involves just under 300 transcription regulators, which is also further modulated according to several cell types in humans and mice.²⁹ The ribosome is also a prime example of the evolutionary paradox of sequence conservation of both functional genes and regulatory sequences.³⁰ Among the approximately 60 proteins that are represented by an ortholog (gene in different species retaining the same function) in every single cellular life-form with a sequenced genome, over 50 are components of the translation machinery.³¹ Some of these ribosomal protein genes (RPGs) are necessary for function or required for

self-assembly, whereas others can be used for stimulation of the translation process.⁴ Ribosomal dysfunction is in the background of at least a dozen diseases, including some forms of cancer (table 1) (see appendix⁶²).³² This is evidence that these proteins could not have evolved gradually over time, but are part of a complex functional unit.

Evolutionists argue that during ribosomal evolution, different proteins were co-opted from other processes. The ribosome is made up of approximately 80 proteins, around half of which play an exclusive role within the ribosome. The remainder of those studied have extra-ribosomal functions (although seven of them have not yet been studied, according to Wang *et al.*).³³ Thus, since half of all ribosomal proteins (RPs) have no role outside of the ribosome, the co-option argument does not appear realistic.

The conservation of the 80 ribosome RPs can be studied across a range of species using the Ribosomal Protein Gene Database (RPGD).³⁴ For each protein, the number of database sequences, the number of species, and the percent conservation were noted (see materials and methods section). We found that 48.8% (39 out of 80) RPs from the database had at least 50% sequence conservation (table 2) (see appendix⁶²). In a study of 41 of the 54 RPs from *Escherichia coli*, these genes were individually deleted to verify whether they are necessary for ribosomal function. Of these 41 proteins, nine (22%) were shown to be non-essential (RPs S9, S17, L15, L21, L24, L27, L29, L30, and L34).³⁵ This is taken to mean that the ribosome performs basic functions essential for existence and that the operational design is robust hence accounting for the use of common elements. Further, the RPGD (136 RP alleles) was compared to the *Saccharomyces* Genome Database,³⁶ to see what effect the null mutation (when the gene is functionally knocked out) had on each individual gene. It was found that 113 alleles showed a reduced phenotype, 22 were unviable, and one had no information. This was again taken to indicate the functional necessity of the majority of alleles.

Related analyses have been extended to prokaryotes. Yutin *et al.*³⁷ counted the number and distribution of RPs in a study of 995 bacterial species and 87 archaeal species. The level of conservation of the proteins is shown in figures 2 and 3. Fifty six out of 71 (78.9%) RPs were conserved in all 87 archaeal species, and 44 out of 56 (78.6%) RPs are conserved in all 995 bacterial species. Of the small and large subunit proteins, which are not universally conserved among the 995 bacterial species, S21 and L17 are found on the surface of the ribosome in *E. coli*, suggesting that they are free to mutate, and are thus unessential. Of these two, S21 was deleted from *E. coli* via λ -Red-mediated recombination.³⁵ Only four RPs that are not present in the 995 species are not exposed on the surface of *E. coli*.³⁸ Of these, S16 and L31 were present in 99.9%, L34 in 99.7%, and L30 was present in 85.4% of all

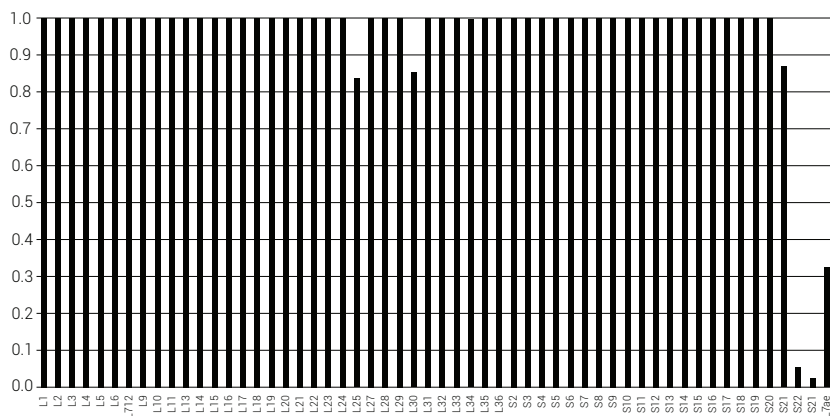


Figure 2. The percent of 995 bacterial species, which contain different ribosomal proteins

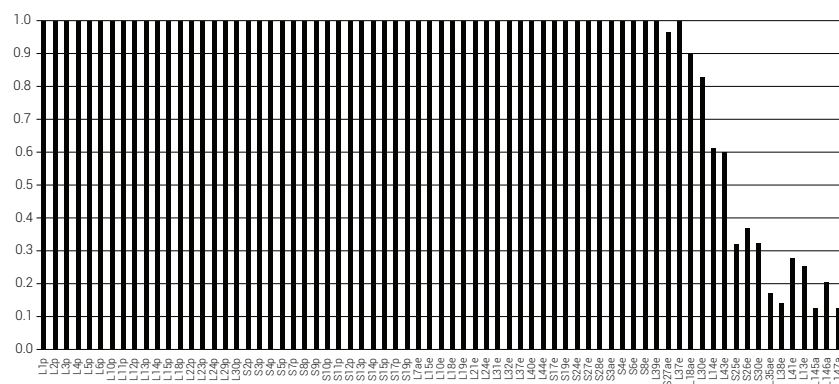


Figure 3. The percent of 87 archaeal species, which contain different ribosomal proteins

995 species. The proteins L9, L19, L25, L30, L34, and L36 within the LSU of *E. coli* can be seen in figure 4.

When comparing RPs across Eukarya, Archaea, and Bacteria, as well as mitochondria and chloroplasts, Mears *et al.*³⁹ found that among both the SSU and the LSU, the degree of protein conservation was somewhat less, and even more so when comparing with the organelles (see table 3). Conservation of RPs in the LSU of the two organelles was as low as 23.7%, but this is on account of the comparison being made across differing domains of life. The conservation of RPs is as high as 85.7% in the SSU in Bacteria, within a single domain. The study was used to speculate about spatial changes occurring in ribosomal subunits during evolution. We do not resonate with this use of the data. It can be interpreted to mean that the ribosomes represented in the different domains of life were uniquely created and any similarity to the ribosomes of other domains was used to perform essentially similar functions. This section of our conclusion is not dissimilar to that of Mears *et al.*³⁹ when they state that conserved residues “are generally found in areas that are known to be functionally significant”.

In studying ribosomal proteins, investigators have distinguished between essential and non-essential proteins. This refinement is performed to give greater insights into the supposed movement of genes during evolution. In one study the λ -Red-mediated recombination approach was used to alter the bacterial genome and study the function of 41 ribosomal subunit proteins. Nine proteins appeared to be non-essential (deletion was not lethal) according to the limited stress tests applied, but it is significant to note that complete removal of some of these ‘non-essential’ proteins led to alterations in growth and ribosomal function. This is not surprising as the ribosomal proteins are involved in conformational changes in ribosomes as well as in interactions with other components connected with translation. Further studies have added additional non-essential proteins to the list.⁴⁰ Akanuma *et al.*⁴¹ usefully have outlined some of the difficulties in determining whether a protein is essential or not. Fundamental is whether mutants contained the expected structure for a correct deletion. The percentage may be as low as 25%. Additional issues

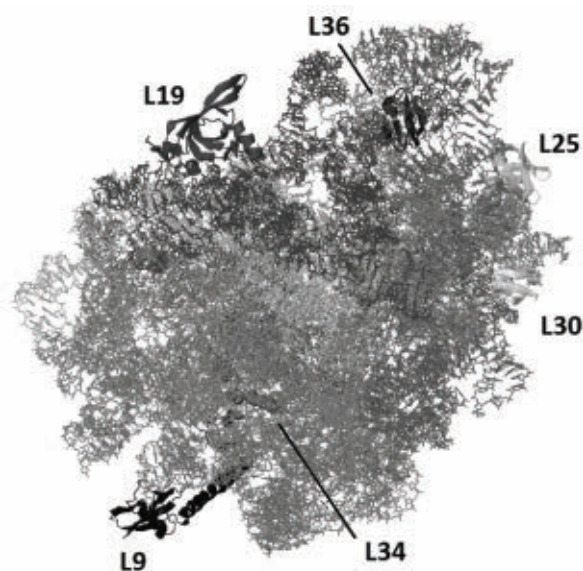


Figure 4. Position of RP L9, L19, L25, L30, L34 and L36 in the LSU of the ribosome of *E. coli*

involve the presence of suppressor sequences that permit viability of mutants, and the presence of duplicate genes. Culture conditions may contribute to failures in correct identification, as well as technical problems involving primer design.⁴⁰ Apart from these difficulties, a range of ribosomal proteins has been identified that have no apparent vital function. Whereas some of these conclusions may be correct, statements about non-essentiality will undoubtedly be revised as more sophisticated methods are used and a greater range of organisms is analyzed. One caution is merited. When investigators write about the non-essentiality of a gene, which gives rise to non-essential proteins, this does not necessarily mean that the absence of such a gene has no effect. This is illustrated nicely with *Saccharomyces*. The single copy of the RPL29 gene is considered non-essential. It codes for a 60S ribosomal subunit protein (Rpl29p). However, its absence retards the coupling of 60S and 40S subunits and also translation events. There are also interactions between RPL29 and essential genes.⁴²

Taxonomic distribution of ribosomal proteins and patterns of gene loss for ribosomal proteins

Taxonomic distribution of ribosomal proteins between the three domains of life

According to Fox²⁶ and Barbieri⁴ the ribosome would have existed in essentially its modern form by the time of the Last Universal Common Ancestor (LUCA). However, there is variation across the three domains of life. Within each domain conservation is stronger than between domains.⁴³

Table 3. Degree of conservation of proteins in different domains within the small ribosomal unit (SSU) and the large ribosomal unit (LSU)

Group	SSU	LSU	Reference
Archaea	18/22 (81.8%)	26/34 (76.5%)	Yutin ³⁷
Bacteria	24/28 (85.7%)	32/43 (74.4%)	Yutin ³⁷
Archaea, Bacteria, Eukarya	15/24 (62.5%)	20/38 (52.6%)	Mears ³⁹
Archaea, Bacteria, Eukarya	15/40 (37.5%)	17/62 (27.4%)	Lecompte ⁴⁴
Archaea, Bacteria, Eukarya + mitochondria, chloroplast	13/24 (54.2%)	9/38 (23.7%)	Mears ³⁹

Table 4. Pearson correlation between Archaea, Bacteria, and Eukarya according to the absence/presence of different RPs in their genome

	Archaea + Bacteria	Archaea + Eukarya	Bacteria + Eukarya
SSU	0.32	0.7	0.03
LSU	0.03	0.71	-0.31
SSU+LSU	0.14	0.71	-0.19

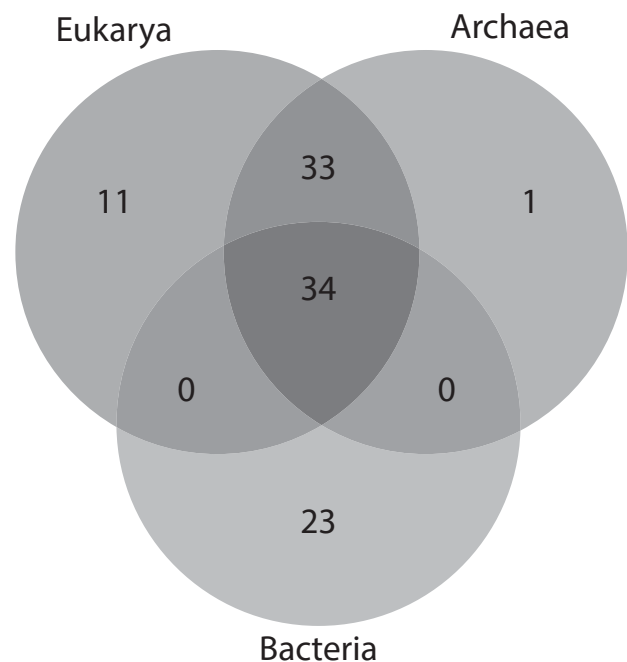


Figure 5. The number of ribosomal protein genes common and unique to Archaea, Bacteria, and Eukarya

Out of in excess of a hundred ribosomal protein genes (RPGs), 32 were conserved in all three main domains of life (Eukarya, Archaea, and Bacteria), 33 are common to only Eukarya and Archaea, whereas there are no RPGs specific to Eukarya and Bacteria or Archaea and Bacteria. Twenty-three RPGs are unique to Bacteria, whereas 11 are unique to Eukarya, and only 1 to Archaea (figure 5).⁴⁴

Márquez *et al.*⁴⁵ also discovered nine RPs which hypothetically might be unique to Archaea. According to the Lecompte data, Archaea+Eukarya have a 0.7–0.71 Pearson correlation coefficient with each other, according to the absence/presence of RPs in the SSU, the LSU, or in both (table 4). The data as a whole poses a recognized problem in that no clear evolutionary scenario emerges and one is left to ponder whether prokaryotes emerged from an ancestral eukaryote genome, a bacterial-like genome or whether symbiosis was involved,⁴² as we will elaborate on later.

The information is noteworthy to us too, since eukaryotes have a 60S large subunit (LSU), and a 40S small subunit (SSU), whereas prokaryotes such as Archaea and Bacteria have a 50S LSU and a 30S SSU. This would imply that the ribosomes of Archaea and Bacteria are structurally different from than that of Eukaryotes. However, the absence/

presence correlation of RPs discussed previously suggests that the ribosomes of Archaea and Eukarya also group away from Bacteria. This suggests to us that Archaea, Bacteria, and Eukarya are all distinctly created domains of life.

Ribosomal proteins of the mitochondrion and chloroplast

Eukaryotic mitochondrial RPs have originated from prokaryotes in the view of some evolutionists. They point as evidence to size similarity between the two types of ribosomes, as well as sequence homology. However, mitochondrial ribosomes are missing some RPs present in prokaryotes, and have unique proteins of their own, which are not homologous to bacterial RPs.⁴⁶ These unique proteins replace the function of rRNAs in the prokaryotic organisms, such as the 50% of rRNAs that correspond to a RP in the protist *Leishmania tarentolae*.⁴⁷ When ribosomal proteins of *E. coli* and the human mitochondrial ribosome are compared (table 5) (see appendix⁶²), only 42 of the 88 proteins (47.7%) are common between the two types of ribosomes, with 12 being unique to *E. coli*, and 34 unique to the human mitoribosome. In a further example, yeast MRP51 gene encodes a novel protein responsible for global mitochondrial translation.⁴⁸ Again, the function of MPS33 in *Drosophila melanogaster* is unknown, but its absence can cause cardiomyopathy⁴⁹ and MRPL55 has been shown to be necessary for mitochondrial biogenesis.⁵⁰

Similar to the mitochondrion, the chloroplast ribosome is also missing RPs compared to the prokaryotic ribosome, and also contains RPs not found in the ribosomes of prokaryotes. The RP content of *E. coli* and *Chlamydomonas reinhardtii* is compared in table 5. There is an 80.3% commonality.⁵¹ Despite the high number of common RPs, the chloroplast RPs that are in common with Bacteria also have novel protein domains. For example, a plastid-specific ribosomal protein (PSRP-3) takes part in the regulation of translation, whereas PSRP-7 assists the positioning of mRNA during translation initiation. RAP38 and RAP41 are ribosome-associated proteins, which take part in translation.⁵²

Once again, just because prokaryotic ribosomes are superficially similar to eukaryotic mitochondrial ones, does not necessarily mean that they are descended from them.⁵³

Loss of ribosomal protein genes (RPGs)

Evolutionists surmise that, with the exception of the LXa gene, the full complement of RPs was present in the ancestor of Archaea and Eukarya, with reductive evolution happening on the scale of a whole domain. Furthermore, this led Lecompte *et al.*⁴⁴ to suggest that the full complement of archaeal RPs was present in the cenancestor of both Archaea and Eukarya, leading to the conclusion that the prokaryotes evolved by simplification of this ancestral eukaryotic-like genome, an idea suggested by several

authors.^{54,55} This creates an uncomfortable dilemma for evolutionists in that they have to choose between such a theory of origin as opposed to one based on a symbiotic hypothesis involving eubacteria and methanogenic Archaea or even other possibilities.⁵⁶ An added dilemma is introduced in that it is admitted that closeness of sequence similarity need not mean a close phylogenetic relationship unless there were similar rates of evolution involved with the different lineages considered.⁵⁷

RPG losses are restricted to small numbers of divergent species or genera, meaning that these gene deletion events occur independently in these lineages. RPG losses tend to happen more frequently in intracellular pathogens, such as *Mycoplasma genitalium*, *M. pneumoniae* and *Encephalitozoon cuniculi*.

The LSU RNA of the microsporidian *Encephalitozoon cuniculi* is greatly reduced in length compared to other eukaryotes, and so is its SSU RNA, which is only ~1300 bp, as compared to ~1600 bp in prokaryotes and ~1800 bp in other eukaryotes. Furthermore, the internal transcribed spacer DNA 2 region (ITS2) located between the 5.8S and 28S region in eukaryotes is lacking in *E. cuniculi*, suggesting, to those seeking evolutionary clues to origins, that this species is one of the earliest eukaryotic species to diverge from prokaryotes.⁵⁸ However, the parasitic lifestyle of this species suggests otherwise, namely that the loss of the ITS2 spacer and the smaller size of the two ribosomal RNA subunits indicates that it has been derived from other eukaryotes and not prokaryotes. Further analysis of *E. cuniculi* has indicated that it contains mitochondrial genes (e.g. the Fe-S cluster assembly), suggesting that this organism group arose as a result of degenerative processes.⁵⁹ The clear implication is that though some prokaryotes may show similarities to eukaryotes this doesn't mean that such features could not have come from prokaryotes.⁵³ Conversely, certain prokaryotic features present in eukaryotes also do not necessarily mean that eukaryotes evolved from prokaryotes.

Conclusion

The ribosome is an example of sudden, early complexity, if evolution is true. Its appearance raises many speculative events, sequences, and unresolved issues,⁶⁰ making such a scenario highly dubious. A number of theories surrounding the evolution of the genetic code and of ribosomal evolution have been examined, but have been found lacking in any form of convincing evidence. Rather, due to its content and intricacy of operation, the ribosome is an example of irreducible complexity, with several dozen proteins making up its functional-structural core. The ribosome differs in make-up between Archaea, Bacteria, and Eukarya, with a number of RPs which are unique to each, suggesting

that these structures did not evolve from each other but rather came into being separately by special creation. Also, some of the ribosomes in prokaryotes are missing from the mitochondria and chloroplasts of eukaryotes. Novel proteins have been found. This is taken to highlight their independent creation. The existence and distribution of RPs does not make sense, except in the light of creation.

Materials and methods

Figures 2 and 3 were drawn in Excel. Figure 4 was made using the RiboVision software (Bernier *et al.*⁶¹). Figure 5 was made using the Venn diagram software at bioinformatics.psb.ugent.be/webtools/Venn/. The multiple alignment of all 80 eukaryotic RPs were downloaded from the Ribosomal Protein Gene Database at ribosome.med.miyazaki-u.ac.jp/. A perl script was used to calculate the degree of conservation in each of the proteins. A position in the multiple alignment was taken to be conserved if any given amino acid was present in at least 80% of the sequences. Only those positions were counted where at least 90% of the characters were not a gap character (“-”). The data for table 1 was taken from Narla *et al.*³² and Wang *et al.*³³ Deletion information was taken from the *Saccharomyces* Genome Database³⁶. Ribosomal protein annotation for *Chlamydomonas reinhardtii* was taken in part from the Joint Genome Institute (JGI) at genome.jgi.doe.gov/Chlre3/Chlre3.download.ftp.html.

References

- Black, J.G., *Microbiology*, 8th edn, John Wiley & Sons, Singapore, pp. 167–172, 2013; Woese, C.R., Interpreting the universal phylogenetic tree, *Proceedings of the National Academy of Sciences USA* (PNAS) **97**(15):8392–8396, 2000.
- Root-Bernstein, M. and Root-Berstein, R., The ribosome as a missing link in the evolution of life, *J. Theoretical Biology* **367**:130–158, 2015.
- Barbieri, M., Codepoiesis—the deep logic of life, *Biosemiotics* **5**: 297–299, 2012.
- Barbieri, M., Evolution of the genetic code: the ribosome-oriented model, *Biological Theory* **10**:301–210, 2015.
- Wang, X., NMR study of the *Escherichia coli* 70S ribosome particles using residual dipolar couplings, PhD. thesis, University of California, LA, 2012.
- Khatter, H., Myasnikov, A.G., Natchiar, S.K., and Klaholz, B.P., Structure of the human 80S ribosome, *Nature* **520**(7549):640–645, 2015.
- Yamaguchi, K. and Subramanian, A.R., The plastid ribosomal proteins. Identification of all the proteins in the 50 S subunit of an organelle ribosome (chloroplast), *J. Biological Chemistry* **275**(37):28466–28482, 2000.
- O’Brien, T.W., Properties of human mitochondrial ribosomes, *IUBMB Life* **55**(9):505–13, 2003.
- Koonin, E.V. and Novozhilov, A.S., Origin and evolution of the genetic code: the universal enigma, *IUBMB Life* **61**(2):99–111, 2009.
- Woese, C.R., Order in the genetic code, *PNAS* **54**(1):71–75, 1965.
- Gamow, G., Possible relation between deoxyribonucleic acid and protein structures, *Nature* **173**(4398):318, 1954.
- Wong, J.T., A co-evolution theory of the genetic code, *PNAS* **72**: 1909–1912, 1975.
- Petrov, A.S., Gulen, B., Norris, A.M., Kovacs, N.A., Bernier, C.R. *et al.*, History of the ribosome and the origin of translation, *PNAS* **112**(50):15396–401, 2015.
- Carter, C.W. and Wolfenden, R., tRNA acceptor stem and anticodon bases form independent codes related to protein folding, *PNAS* **112**(24): 7489–7494, 2015.
- Harish, A. and Caetano-Anolles, G., Ribosomal history reveals origins of modern protein synthesis, *Plos One*, 12 March 2012 | doi.org/10.1371/journal.pone.0032776.
- Freeland, S.J., Wu, T., and Keulmann, N., The case for an error minimizing standard genetic code, *Origins of Life and Evolution of the Biosphere* **33**:457–477, 2003.
- Vetsigian, K., Woese, C., and Goldenfeld, N., Collective evolution and the genetic code, *PNAS* **103**(28):10696–10701, 2006.
- Saxinger, C., Ponnamperna, C., and Woese, C., Evidence for the interaction of nucleotides with immobilized amino-acids and its significance for the origin of the genetic code, *Nature New Biology* **234**(49):172–174, 1971.
- Yarus, M., Caporaso, J.G., and Knight, R., Origins of the genetic code: the escaped triplet theory, *Annual Review of Biochemistry* **74**:179–198, 2005.
- Wong, J.T., Evolution of the genetic code, *Microbiology* **5**:174–181, 1988.
- Amirnovin, R., An analysis of the metabolic theory of the origin of the genetic code, *J. Molecular Evolution* **44**:473–476, 1997.
- Higgs, P.G. and Pudritz, R.E., From protoplanetary disks to prebiotic amino acids and the origin of the genetic code; in: Pudritz, R.E., Higgs, P.G., and Stone, J. (Eds.), *Planetary Systems and the Origins of Life*, vol. 3, Cambridge University Press, Cambridge, UK, 2007.
- Novozhilov, A.S., Wolf, Y.I., and Koonin, E.V., Evolution of the genetic code: partial optimization of a random code for robustness to translation error in a rugged fitness landscape, *Biology Direct* **2**:24, 2007 | doi:10.1186/1745–6150–2–24.
- Schimmel, P., Giege, R., Moras, D., and Yokoyama, S., An operational RNA code for amino acids and possible relationships to genetic code, *PNAS* **90**(19):8763–8768, 1993.
- Petrov, A.S., Bernier, C.R., Hsiao, C., Norris, A.M., Kovacs, N.A. *et al.*, Evolution of the ribosome at atomic resolution, *PNAS* **111**(28): 10251–10256, 2014.
- Fox, G.E., Origin and evolution of the ribosome, *Cold Spring Harbor Perspectives in Biology* **2**(9):a003483, 2010.
- Strobel, S.A., Repopulating the RNA world, *Nature* **411**:1003–1006, 2001.
- Robertson, M.P. and Joyce, G.G., The origins of the RNA world, *Cold Spring Harbor Perspectives in Biology*, 28 April 2010 | doi:10.1101/cshperspect.a003608.
- Salas, E.N., Shu, J., Cserhati, M.F., Weeks, D.P., and Ladunga, I., Pluralistic and stochastic gene regulation: examples, models and consistent theory, *Nucleic Acids Research* **44**(10):4595–609, 2016.
- Cserh ti, M., Creation aspects of conserved non-coding sequences, *J. Creation* **21**(2):101–108, 2007.
- Wolf, Y.I. and Koonin, E.V., On the origin of the translation system and the genetic code in the RNA world by means of natural selection, exaptation, and subfunctionalization, *Biology Direct* **2**:14, 2007 | doi:10.1186/1745–6150–2–14.
- Narla, A. and Ebert, B.L., Ribosomopathies: human disorders of ribosome dysfunction, *Blood* **115**(16):3196–3205, 2010.
- Wang, W., Nag, S., Zhang, X., Wang, M.H., Wang, H. *et al.*, Ribosomal proteins and human diseases: pathogenesis, molecular mechanisms, and therapeutic implications, *Medical Research Reviews* **35**(2):225–285, 2015.
- Nakao, A., Yoshihama, M., and Kenmochi, N., RPG: the Ribosomal Protein Gene database, *Nucleic Acids Research* **32**(Database issue):D168–70, 2004.
- Shoji, S., Dambacher, C.M., Shajani, Z., Williamson, J.R., and Schultz, P.G., Systematic chromosomal deletion of bacterial ribosomal protein genes, *J. Molecular Biology* **413**(4):751–761, 2011.

36. Cherry, J.M., The *Saccharomyces* Genome Database: a tool for discovery, *Cold Spring Harbor Protocols* 2015(12):pdb.top083840 | doi:10.1101/pdb.top083840.
37. Yutin, N., Puigbò, P., Koonin, E.V., and Wolf, Y.I., Phylogenomics of prokaryotic ribosomal proteins, *PLoS One* 7(5), e36972, 2012 | doi:org/10.1371/journal.pone.0036972.
38. Agafonov, D.E., Kolb, V.A., and Spirin, A.S., Proteins on ribosome surface: measurements of protein exposure by hot tritium bombardment technique, *PNAS* 94(24):12892–12897, 1997.
39. Mears, J.A., Cannone, J.J., Stagg, S.M., Gutell, R.R., Agrawal, R.K. *et al.*, Modeling a minimal ribosome based on comparative sequence analysis, *J. Molecular Biology* 321(2):215–34, 2002.
40. Akanuma, G., Nanamiya, M., Natori, Y., Yano, K. *et al.*, Inactivation of ribosomal genes in *Bacillus subtilis* reveals importance of each ribosomal protein for cell proliferation and cell differentiation, *J. Bacteriology* 194(22):6282–6291, 2012.
41. Baba, T., Ara, T., Hasegawa, M., Takai, Y. *et al.*, Construction of *Escherichia coli* K-12 in-frame single-gene knockout mutants: the Keio collection, *Molecular Systems Biology* 2(1) 2006 | doi:10.1038/msb4100050.
42. DeLabre, M.L., Kessl, J., Kamanou, S., and Trumpower, B.L., RPL29 codes for a non-essential protein of the 60S ribosomal subunit in *Saccharomyces cerevisiae* and exhibits synthetic lethality with mutations in genes for proteins required for subunit coupling, *Biochimica et Biophysica—Gene Structure and Expression* 1574:225–261, 2002.
43. Roberts, E., Sethi, A., Montoya, J., Woese C.R., and Luthey-Schulten Z., Molecular signatures of ribosomal evolution, *PNAS* 105:13953–13958, 2008.
44. Lecompte, O., Ripp, R., Thierry, J.C., Moras, D., and Poch, O., Comparative analysis of ribosomal proteins in complete genomes: an example of reductive evolution at the domain scale, *Nucleic Acids Research* 30(24):5382–5390, 2002.
45. Márquez, V., Fröhlich, T., Armache, J.P., Sohmen, D., Dönhöfer, A. *et al.*, Proteomic characterization of archaeal ribosomes reveals the presence of novel archaeal-specific ribosomal proteins, *J. Molecular Biology* 405(5):1215–32, 2011.
46. Rackham, O. and Filipovska, A., Supernumerary proteins of mitochondrial ribosomes, *Biochimica et Biophysica Acta* 1840(4): 1227–1232, 2014.
47. Sharma, M.R., Booth, T.M., Simpson, L., Maslov, D.A., and Agrawal R.K., Structure of a mitochondrial ribosome with minimal RNA, *PNAS* 106(24):9637–42, 2009.
48. Green-Willms, N.S., Fox, T.D., and Costanzo, M.C., Functional interactions between yeast mitochondrial ribosomes and mRNA 5' untranslated leaders, *Molecular and Cellular Biology* 18(4):1826–1834, 1998.
49. Casad, M.E., Abraham, D., Kim, I.M., Frangakis, S., Dong, B. *et al.*, Cardiomyopathy is associated with ribosomal protein gene haplo-insufficiency in *Drosophila melanogaster*, *Genetics* 189(3):861–870, 2011.
50. Tselykh, T.V., Roos, C., and Heino, T.I., The mitochondrial ribosome-specific MrpL55 protein is essential in *Drosophila* and dynamically required during development, *Experimental Cell Research* 307(2): 354–366, 2005.
51. Manuell, A.L., Quispe, J., and Mayfield, S.P., Structure of the chloroplast ribosome: novel domains for translation regulation, *PLoS Biology* 5(8):e209, 2007 | doi:10.1371/journal.pbio.0050209;
52. Yamaguchi, K., Beligni, M.V., Prieto, S., Haynes, P.A., McDonald, W.H. *et al.*, Proteomic characterization of the *Chlamydomonas reinhardtii* chloroplast ribosome: identification of proteins unique to the 70S ribosome, *J. Biological Chemistry* 278(36):33774–33785, 2003.
53. O'Micks, J., Molecular structures shared by prokaryotes and eukaryotes show signs of only analogy and not homology, *Answers Research J.* 9: 284–292, 2016.
54. Desmond, E., Brochier-Armanet, C., Forterre, P., and Gribaldo, S., On the last common ancestor and early evolution of eukaryotes: reconstructing the history of mitochondrial ribosomes, *Research in Microbiology* 162(1):53–70, 2011.
55. Mariscal, C. and Doolittle, W.F., Eukaryotes first: how could that be? *Philosophical Transactions of the Royal Society, series B: Biological Sciences*, 31 August 2015 | doi:10.1098/rstb.2014.0322.
56. López-García, P. and Moreira, D., Metabolic symbiosis at the origin of eukaryotes, *Trends in Biochemical Sciences* 24(3):88–93, 1999.
57. Iwabe, N., Kuma, K-I., Hasegawa, M., Osawa, S., and Miyata, T., Evolutionary relationship of archaebacterial, eubacteria, and eukaryotes inferred from phylogenetic trees of duplicated genes, *PNAS* 86(23): 9355–9359, 1989.
58. Peyretailade, E., Biderre, C., Peyret, P., Duffieux, F., Méténier, G. *et al.*, Microsporidian *Encephalitozoon cuniculi*, a unicellular eukaryote with an unusual chromosomal dispersion of ribosomal genes and a LSU rRNA reduced to the universal core, *Nucleic Acids Research* 26(15):3513–3520, 1998.
59. Van de Peer, Y., Ben Ali, A., and Meyer A., Microsporidia: accumulating molecular evidence that a group of amitochondriate and suspectedly primitive eukaryotes are just curious fungi, *Gene* 246(1–2):1–8, 2000.
60. Davidovich, C., Belousoff, M., Wekselman, I., Shapira, T. *et al.*, The proto-ribosome: an ancient nano-machine for peptide bond formation, *Israel J. Chemistry* 50:29–35, 2010.
61. Bernier, C.R., Petrov, A.S., Waterbury, C.C., Jett, J., Li, F. *et al.*, RiboVision suite for visualization and analysis of ribosomes, *Faraday Discussions* 169:195–207, 2014.
62. <https://tinyurl.com/y7sqxjlq>

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Carol Cleland's case for historical science— part 1: devaluing experimental science

John K. Reed and Peter Klevberg

Before uniformitarian geology derailed biblical history, the rails were greased by an unwarranted confidence in scientific history. What is the relationship between science, history, and truth? Carol Cleland, a leading philosopher of science, attempts an answer. Reacting to critics who claim historical science is less valid than experimental science, she defends their epistemic equality with both negative and positive arguments. Her negative argument highlights flaws in both the theory and practice of experimental science. Although her arguments ably undermine some modern distortions, her case against experimental science in this paper relies on the straw man of *positivism*—the idea that science is the arbiter of truth—and is thus less robust than a traditional Christian understanding of the relationship between science and revelation.

Carol Cleland and historical science

Geology has begun to interest philosophers of science. This is notable; for many years, philosophers saw physics as the prototypical science and left philosophizing about geology to geologists (e.g. G.G. Simpson, S.J. Gould). But in recent years, increasing numbers of philosophers have been drawn to geology, to the extent that they authored the first three papers of the 2013 Geological Society of America's *Rethinking the Fabric of Geology*.¹ One is Dr Carol Cleland of the University of Colorado, who has built a strong reputation on her defence of historical science as able to guarantee similar levels of epistemic confidence as experimental science.^{2–6} She has been a consistent advocate for historical science during a time when the optimistic positivism of the 19th and 20th centuries has been deflated.

Cleland is correct to prick the pretension of scientists. Positivism has long sold a false confidence in science. Cleland agrees that experimental science is powerful, but argues that it is not a unique path to truth, nor even unique as 'science'.⁷

Cleland's negative case: experimental science is flawed

Cleland focuses on emphasizing the validity of historical science as a separate science, rather than addressing the root problem of naturalism. Her goal is straightforward:

"I argue that while it is true that there are fundamental differences in methodology between the historical natural sciences and classical experimental sciences, it is a mistake to conclude that the scientific status of the former is inferior to that of the latter."⁸

Her pursuit of that goal follows two paths (figure 1). The first is a negative critique of experimental science, seeking to deflate its perceived superiority. Following her outline, we

first examine her negative case. Her argument for this case is twofold—*theoretical and practical weaknesses inherent to experimental science limit its epistemic value*.

Theoretical weaknesses

Though Cleland directs her attack at experimental science, her critique would be more accurately seen as one on the secular distortion of positivism, showing weaknesses in the prevailing secular *attitude* about science, not science *per se*. Positivism has probably passed its zenith as an intellectual idea, but it remains strong as an emotive attitude:

"The essential point of that doctrine is simply the affirmation of science, and the denial of philosophy and religion."⁹

This attitude twists science; it grants to modern science the position occupied by the Bible in earlier generations. As the pinnacle of truth, science breeds an accompanying arrogance, which animates the dismissive attitude of Henry Gee, a senior editor of *Nature* and Cleland's foil:

"Taking aim at all historiographic research, Gee writes, 'they [historiographic hypotheses] can never be tested by experiment, and so they are unscientific No science can ever be historical' For Gee and fellow travelers a genuine test of a hypothesis requires experimentation. Historiographic hypotheses cannot be tested in this manner. Hence, they are unscientific."¹⁰

Cleland attacks that position with a philosophical jujitsu that highlights theoretical and practical flaws. She starts slowly, by drawing a line between practitioners and philosophers of science:

"Many scientists and most laypersons are still enthralled by this conception of science as a fundamentally experimental enterprise, which helps to explain some of the trenchant criticisms mounted

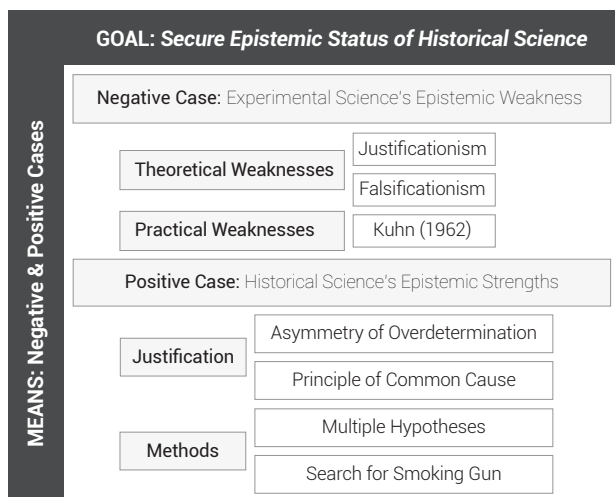


Figure 1. A map of Cleland's argument for epistemic equality of historical and experimental science. This paper focuses on the negative case against experimental science.

against scientific historiography. However, this view is no longer popular among philosophers of science.”¹⁰

Whether or not a view is popular among philosophers of science says little of its validity, nor should it be assumed that philosophers of science, as such, have a mystic insight into truth denied to ‘scientists and most laypersons’. But she moves to a firmer footing by noting the major theoretical weakness of induction, ironically traced back to David Hume—an early and enthusiastic secularist:

“Unfortunately such inductivism faces David Hume’s ... intractable problems of induction: No finite body of evidence, however varied and extensive, can conclusively establish the truth of a universal generalization applying to unobserved as well as observed cases.”¹¹

She illustrates Hume’s argument by noting that everyone once thought that ‘all swans are white’, until *black* swans were discovered in Australia.

For centuries, science sought to discover truth by testing and confirming hypotheses using what Adler termed *special experience*:

“... experience we have as the result of investigative efforts on our part, *and only as the results of such efforts* [emphasis in original].”¹²

Confirmation, though tentative, happened when *positive* affirmations of hypotheses were made by controlled observation. Early science avoided Hume’s trap because scientists did not demand absolute truth from their work; that was the task of theology, freeing science to discover valid, piecemeal truths without having to deductively justify each conclusion.¹³ Science was tentative; new information provided new insight. But when secularists sought to replace theology with science (as Hume advocated at the end of *An*

Enquiry Concerning Human Understanding), science had to assume that burden. Unfortunately, it took some time for the implication of Hume’s new view of science to penetrate the Enlightenment euphoria.

Eventually, scientists realized that finding *positive* affirmations of hypotheses (which Cleland calls ‘justificationism’) could not prove them:

“... justificationists argue that while hypotheses cannot be conclusively proven, their probability can nonetheless be raised by enough successful predictions. Unfortunately, theories of justificationism face the probabilistic version of the hoary problem of induction.”¹⁴

To ‘rescue’ science, Karl Popper¹⁵ proposed falsifying, instead of justifying, hypotheses. Hypotheses that survived rigorous testing were considered true. But that solution still does not meet Cleland’s standard:

“Philosophers have known for more than half a century that falsificationism is deeply flawed logically. Falsificationism treats hypotheses as if they were being tested in isolation from nature—as if a prediction involves no assumptions about boundary or initial conditions of the hypothesis. But ... hypotheses and theories never stand alone when tested in real-world scenarios. Whether conducted in a lab or the field, a concrete test of a hypothesis involves an enormous number of auxiliary assumptions ... about instrumentation, pertinent conditions, and the absence of potentially interfering factors, many of which are highly theoretical, poorly understood, or simply unknown.”¹⁶

In other words, scientists are finite and fallible and must rely on assumptions to conduct experimental or historical science. Popper’s view is still popular in some circles, but Cleland is correct in noting that neither justificationism nor falsificationism guarantees the epistemic expectations of autonomous science:

“In summary, traditional accounts of the scientific method (justificationism and falsificationism) are logically flawed and moreover do not provide faithful reconstructions of the evidential reasoning of either experimental or historical scientists. It follows that appeals to the ‘scientific method’ cannot be used to undermine the scientific status of the historical sciences.”¹⁶

Cleland seems to believe that she has won a great victory for historical science, by showing that both kinds of science are equally wrong. Instead of turning to Christianity to rescue truth, scholars prefer to cut off their nose to spite their face.

One of the most interesting implications of Cleland’s argument is that the *method* of science is not singular:

“In addition, the dogmatic view that the success of science must be attributable to some as yet unspecified

universal scientific method for which experimental science provides the prototype, is undermined by studies showing that even experimental scientists employ a variety of different methods in their research practice.”¹⁷

She later argues that a single scientific method is unrealistic. Instead, each ‘kind’ of science should have its own method:

“In the first place ... many doubts about the scientific status of historical research are rooted in a one-size-fits-all account of the methodology of science that is deeply flawed, both logically and as an account of the actual practices of scientists (including experimentalists).”¹⁸

If this is true, how is ‘science’ defined? Is it a meaningless ‘feel-good’ qualifier? Dimly perceiving this problem, Cleland insists that it retains an essential unity by virtue of the same goal—relating hypotheses to explanations and predictions via empirical evidence. In that sense:

“Most historiographic hypotheses are supported or ‘confirmed’ by evidence in virtue of the power of the hypothesis to *explain* (vs *predict*) the evidence.”¹⁹

The process is not as neat in historical science as it is in experimental science because:

“Experience suggests, however, that if there are regularities relating particular evidential traces to their long past causes they are extremely messy and rough, riddled with exceptions and contingencies, and thus not at all like the stereotypical laws of physics.”²⁰

She brushes aside these problems as the price of doing business, admitting that scientists like Gee may have a small case if their understanding of historical science is correct:

“The central problem with narrative accounts of scientific historiographic explanation is the stress placed upon formulating a coherent story over empirically validating it ... This conflicts with the traditional emphasis in natural science on evidential warrant. ... If the main reason for accepting a historiographic hypothesis is its explanatory power and it draws its explanatory power primarily from the coherence and continuity of a quasi-fictional story, then scientific historiography really does seem inferior to experimental science.”²¹

She insists, however, that this is not a problem because science is not about an experimental method, but:

“... the central focus of historians of nature is on securing empirically well-founded connections between evidence and hypothesis ... they emphasize more direct inferential strategies for inferring long past common causes from present-day effects.”²²

Thus, it is not the traditional scientific method that defines ‘science’, but the ability to empirically establish links between hypotheses and evidence. In her view,

experimental science does that in terms of *prediction*; historical science does it in terms of *retrodiction*. At root, Cleland insists that scientists of all stripes are simply linking empirical evidence to hypothesis:

“I conclude that the putatively problematic differences in research strategies between historical scientists and experimentalists reflect pervasive causal differences in their evidential situations; the methodology of each domain is designed to accommodate and exploit causal, as well as logical characteristics of the evidential relation between hypothesis and observation. The view that historical science is somehow inferior to experimental science is based upon a mistaken account of scientific methodology that reconstructs scientific reasoning entirely in terms of purely formal, logico-mathematical considerations.”¹⁴

Practical weaknesses

After highlighting some theoretical weaknesses of experimental science, making assertions that historical and experimental science have distinct methods, and redefining ‘science’ as ‘linking evidence to hypothesis’, she proceeds to the second aspect of her argument—experimental science also fails in practice. She leans heavily on Kuhn:²³

“The ‘logic’ of the methodology of science was not the only victim of post-positivist critiques of science. Hanson ... and Kuhn ... attacked the idea that observation, however carefully conducted, is unbiased, establishing that all evidence is irrevocably contaminated by theory; in order to count as evidence, observations must be interpreted and interpretation inevitably utilizes theoretical concepts and assumptions. ... In short, experimental science had failed to live up to its early promise as a model for all science.”²⁴

In other words, scientists are not AI (artificial intelligence) truth machines. We all know that scientists are fallible, not always virtuous, and driven by paradigmatic commitments stemming from their worldview, their politics, greed, or passion. Her insight is valid, but early scientists (thanks to Christianity) understood human nature better than moral relativists. They were realists, expecting man’s fallen nature to produce ‘better’, not ‘perfect’, because that was for the next world.²⁵ But as secularists like Hume displaced Christianity with mathematics and science, and later optimists preached science as a panacea for perfectible humans, the early ethical framework began to crumble. Events have shown its failure and illustrated the truth of Christian doctrine—men cannot attain perfect behaviour any more than they can attain perfect truth.

Early modernists spent the accrued Christian capital, not realizing it was vanishing. Dostoevsky wrote: “If God does

not exist, then everything is permitted”, and scientists are no less exempt from the moral consequences of atheism. Postmodern man is learning that while being the lone atheist in a tolerant, ethical society may be fun, ruling in one of evil and despair is not. Kuhn highlighted relatively minor issues of fallibility; recent events would shock him. We see the political corruption of science,^{26,27} and the persecution of dissidents in academia is now reaching politically incorrect secularists as well as Christians.^{28,29} We are even seeing falsified research results.³⁰ Today’s science needs Christian ethics as well as Christian truth.

So Cleland correctly notes that the theory and practice of science cannot bear the weight of absolute truth. Science minimizes the unknowns and maximizes confidence, but confidence in its results and truth was historically undergirded by faith in the absolute truth of revelation and in man’s ability to comprehend it. Secular man is finally seeing that science’s biblical foundation was not displaced without consequences.

In light of these problems, can the status of historical science be advanced by devaluing experimental science? If ‘justificationism’ fails the test of induction and ‘falsificationism’ does not account for all of the variables in the equation, then science, doomed to uncertainty, certainly has no room for the arrogance of positivism. In Cleland’s opinion, comments by those like Henry Gee are the pot calling the kettle black.

Discussion

Renewed assessments of historical science, whether from philosophers or scientists, should prove beneficial to a brand mired in early 19th century positivism. As such, Cleland’s work is a welcome contrast to the ideological ideas of the mid-20th century. But her work also highlights the failure of Christians to retake this valuable ground.

Many orthodox Christian ideas seem archaic to the postmodern generation. For example, the foundational nature of special revelation to any human truth seems preposterous, because ‘everyone’ knows truth is relative. It is hard then to acknowledge that human knowledge is epistemically inferior to God’s simply because humans are metaphysically inferior to God. The epistemological hierarchy inherent in Christianity (figure 2) has been forgotten. Positivism has been unable to provide a viable substitute, and epistemological egalitarianism contributes to the confusion Cleland seeks to dispel. To make things worse, postmodernists cling to positivism, but as a presupposition, not an intellectual proposition. Thus, they continue to conflate science and history, just as Cleland does.

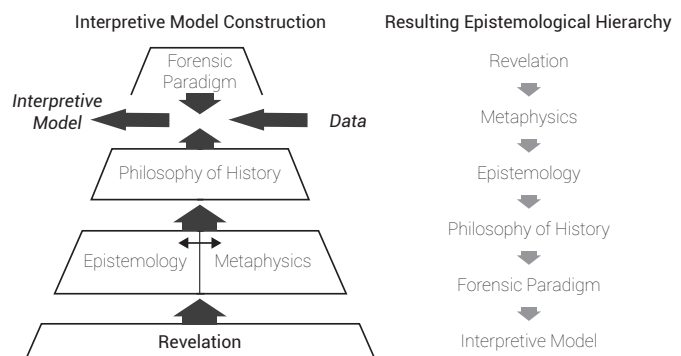


Figure 2. In Christianity, interpretive forensic models are constructed from data shaped by forensic paradigms, which in turn are shaped by philosophical and theological assumptions. For that reason, an epistemological hierarchy is affirmed. Positions are determined by any step’s need for presupposition supplied by another. Metaphysical truth presupposes revelation, defining their relative positions. Forensic models of Earth history occupy the end of a hierarchical chain, depending on a chain of presuppositions.

Cleland raises an immediate red flag in her decision to critique experimental science. Why not simply present a positive case for historical science? Why diminish another discipline? It seems uncomfortably like an emotive appeal to those victimized by the unbridled arrogance of secular scientists. Truth, not equality, should be the objective.

Her negative case exhibits several problems. First and foremost, most of her arguments against experimental science also apply to historical science. Are experimental scientists unable to overcome Hume’s challenge? Historical scientists rely on induction too. Are experimental scientists prone to ignorance, error, bias, dishonesty, greed, or pettiness? Historical scientists are people too. Do unknown or uncontrolled variables preclude absolute certainty in experimental science? Historical science is worse—its uncertainties are much greater, and cannot be reduced by controlled, repetitive experiments. At root, her fundamental error is building a straw man of science as the arbiter of truth.

Furthermore, her ‘epistemic competition’ between experimental and historical science misses the point. Why do *all* empirical disciplines have to be ‘science’? This is a category error; science is a *part* of empirical knowledge, not its sum (figure 3). Adler’s³¹ classification of natural history as a ‘mixed question’—in which philosophy, science, history, theology, and revelation all play a part—is a better description both in theory and in practice.³² That subtlety of an inherent positivism has led us to reject the ‘origin/operation’ model; it repeats this error by labelling origins, history, and even the supernatural, as ‘science’. This view also denigrates history, which is a valid empirical discipline that does not need the appellation ‘science’. Modernists are like a compass needle; they always point to science

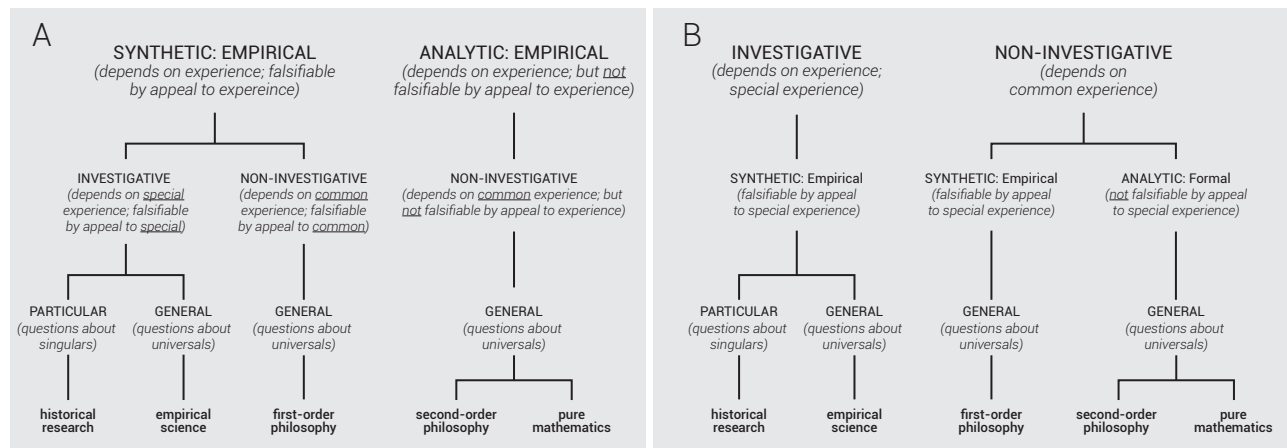


Figure 3. Adler's classification of disciplines based on the dual dichotomies of empirical vs formal and investigative vs non-investigative. Science is more than just 'empirical' and is distinguished from other empirical disciplines by its objects of inquiry, which are questions about universal principles of nature.

for validation. Today, history sells its noble tradition for whatever crumbs science deigns to toss its way.^{33,34}

What about her case against experimental science due to its practical problems? She references those described by Kuhn in the 1960s. We believe they are more problematic today because of inroads made by relativist views about truth and ethics. Apart from God, scientists cannot maintain a consistent intellectual and ethical framework for science. Their practice puts the lie to both. Worse, the coming wave of nihilists won't do science; they will only scavenge its technology. Cleland admits that secular scientists have professional shortcomings, but is not curious about the reasons. Christianity could answer her questions; both epistemological and ethical (figure 4). Cleland is trapped in the world of positivism. This is the major weakness of her case (figure 1).

One way to understand the difference between answers from Christianity and naturalism was described by Adler. He drew a distinction between the absolute truth of *epistēmē* and the contingent, partial, and evolving knowledge of *doxa*. Science belongs to the latter. He looked beyond the binary option of 'knowledge' vs 'opinion' to a trinity of options: (1) private (subjective) opinion, (2) public (objective) opinion, and (3) certain truth (figure 5). Science, like any other valid discipline, provides predominantly public opinion that ranges along a scale of certainty. Error is therefore not catastrophic, because the truths affirmed are largely contingent.

In that construct, Hume's argument is not fatal, because science does not carry the burden of *epistēmē*. God's truth undergirds human knowledge. It also provides the ethical framework needed for science, including the inherent value of people created in God's image. In all these ways, it validates the presuppositions of science, supports its methods, and ethically regulates its practitioners. It does the

Cleland's Critique of Experimental Science	Christian Response
Hume's argument against induction invalidates both justification and falsification	Bible and man in God's image justifies induction as a source of valid but contingent truth
Falsification can never reach truth; too many possibilities to eliminate to reach truth	Since science does not validate itself, it works well discovering contingent truth about nature
Scientists affirm falsification, but do not follow Popper's strategy of 'risky tests'	Scientific method reduces, but does not eliminate human fallibility
All lab variables can never be perfectly reproduced, thus scientific method invalid	Experimentation minimizes uncertainty, does not guarantee absolute truth
Experiments are hard to reproduce for a variety of reasons, thus method invalid	Most sufficiently reproducible; demonstrated by past success; most problems are ethical
Philosophers of science reject justifications by scientists of scientific method	Like scientists, philosophers are not the benchmark of truth; shows need for revelation
Scientists do not follow their own methods all the time; subjective variables exist	Human fallibility expected by Christians; method <i>minimizes</i> , does not eliminate, problems
Research driven by external paradigms; generates a bias in research results	Shows importance of Christian worldview to understanding nature, man and ethics

Figure 4. Christian response to Cleland's negative case. Her points are valid when applied to positivism, but much less so in the context of the Christian worldview.

same for history and any other valid discipline. Differences are not measured in epistemological superiority or inferiority, but by the subjects, questions, and methods each uses. Science may have an advantage in its own domain, but ultimately the contingent truths of any discipline are

measured against the absolute truth of God's knowledge, not each other.

The creation trials of the 1980s forced both Christians and secularists to question the reigning positivist view of science. The cases turned on distinguishing 'science' from 'religion'. Although the judges assigned secular geohistory and biohistory to 'science', and creationism to 'religion', their confidence was not shared by some philosophers. Laudan³⁵ questioned the demarcation criteria assumed during the trials. By 1992, Bauer was questioning whether there was such a thing as the 'scientific method'.³⁶

Christians belatedly addressed these questions, but did not reassert the uniquely Christian foundations of science. Instead they looked for a resolution *within* positivism, typically inventing multiple kinds of science.^{37–39} Others ignored the question:

"... most contemporary philosophers of science regard the question, 'What methods distinguish science from nonsense?' as both intractable and uninteresting."⁴⁰

But creationists should address the nature and practice of science. Liberating it from both modernist positivism and postmodernist relativism can only be done by Christianity.

Cleland's main failing is having no foundation for unified, absolute truth. Empiricism demands the possibility of ongoing revision. Creationists are best placed to see the damage to science and history caused by modernism⁴¹ and postmodernism.^{42,43} Biblical Christianity created the intellectual conditions for science, and only biblical

Christianity can save science, since science cannot survive the collapse of normative truth and ethics. The challenge for creationists has moved from justifying biblical history to rescuing both science and history from the abyss of relativistic views of truth and ethics. The damage is already great; recent decades have seen an accelerating subordination of truth to ideology—most obvious in the climate wars—and that loss of truth (and derivative ethics) echoes through science:

"It is simply no longer possible to believe much of the clinical research that is published, or to rely on the judgment of trusted physicians or authoritative medical guidelines. I take no pleasure in this conclusion, which I reached slowly and reluctantly over my two decades as an editor of the *New England Journal of Medicine*."⁴⁴

Conclusion

Secularists and Christians alike are confused about the nature of science, thanks to years of distortion. Both appear to approve of multiple kinds of science, although that raises the question of which kinds are more 'scientific' than others. Cleland attempts to justify the equality of experimental and historical science by first pointing to theoretical and practical problems with experimental science as an indication that their perceived superiority is misplaced. But her negative case depends on several assumptions. The first is the category error of conflating empiricism and science, which shows up as defining 'science' as nothing more than empirically

linking hypotheses to evidence. The second is the presuppositional error of positivism, which places a burden on science (of any kind) that cannot be borne. Experimental science and natural history are epistemic equals only in the sense that both are unique, empirical disciplines able to find truth *within* the Christian worldview. They are *not* epistemic equals in the sense of certainty, because the experimental method allows a reduction in subjective elements that the forensic methods of natural history do not.

Christians have been heavily influenced by positivism and fall prey to the same trap. Geisler,³⁷ Geisler and Anderson,³⁸ and Thaxton *et al.*³⁹ illustrated this with their scheme of expanding science to include: 'operation science', 'historical science', 'origin science', and 'supranormal science', which perpetuated positivism. Creationists

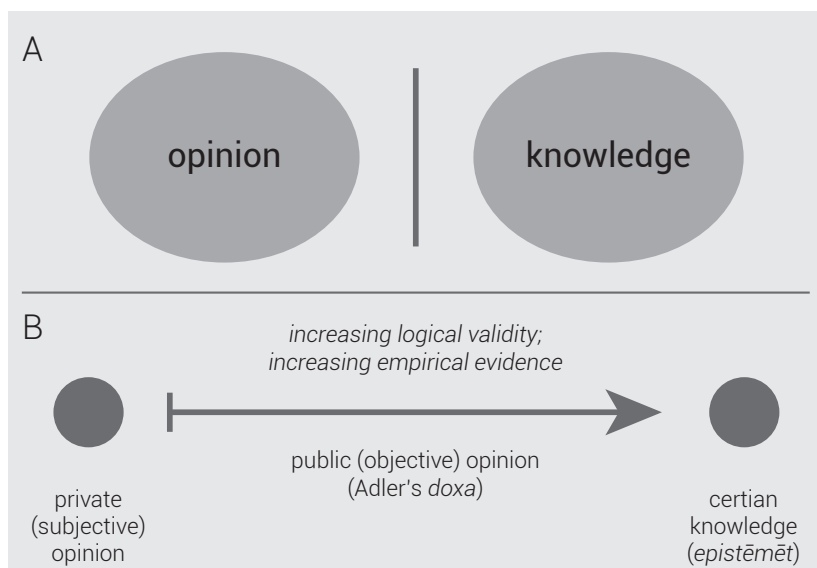


Figure 5. Instead of a binary division between opinion and knowledge (A), Adler recognized a distinction between private and public opinion (B). Public opinion, *doxa*, can increase in certainty along a scale of increasing logical validity and increasing empirical confirmation. Absolute knowledge, *epistēmē*, is the limited set of indubitable truth. If science is not *epistēmē*, then Cleland's critique loses much of its urgency.

often abridge this idea to the dualistic ‘origins’ and ‘operations’ science. But language is always critical to thought, and so we encourage more careful use of language and the re-evaluation of both science and history within the worldview of the Bible.

References

1. Baker, V.R. (Ed.), *Rethinking the Fabric of Geology*, Geological Society of America Special Paper 502, Boulder, CO, 2013.
2. Cleland, C.E., Historical science, experimental science, and the scientific method, *Geology* 29(11):987–990, 2001.
3. Cleland, C.E., Methodological and epistemic differences between historical science and experimental science, *Philosophy of Science* 69:474–496, 2002.
4. Cleland, C.E., Philosophical issues in natural history and its historiography; in: Tucker, A. (Ed.), *A Companion to the Philosophy of History and Historiography*, John Wiley & Sons, Chichester, UK, pp. 44–62, 2011.
5. Cleland, C.E., Prediction and explanation in historical natural science, *British J. Philosophy of Science* 62:551–582, 2011.
6. Cleland, C.E., Common cause explanation and the search for the ‘smoking gun’, in: Baker, ref. 1, pp. 1–10.
7. As an aside, there is irony in Cleland’s case. Charles Lyell caught a 19th century wave of scientific euphoria, and built uniformitarian natural history as an extension of Newton’s physics, linking the two through his deceptive ‘uniformity principle’. He succeeded in riding Newton’s coat-tails to an exalted height. Now that the positivist wave is receding, Cleland advances a high view of geology by denigrating physics! See Laudan, R., *From Mineralogy to Geology: The foundations of a science, 1650–1830*, University of Chicago Press, Chicago, IL, 1987.
8. Cleland, ref. 6, p. 1.
9. Adler, M.J., *A Second Look in the Rearview Mirror*, Macmillan, New York, pp. 31–32, 1992.
10. Cleland, ref. 4, p. 45, brackets hers.
11. Cleland, ref. 4, p. 47.
12. Adler, M.J., *The Conditions of Philosophy*, Athenaeum Press, New York, p. 102, 1965.
13. Glover, W., *Biblical Origins of Modern Secular Culture*, Mercer University Press, Macon, GA, 1984.
14. Cleland, ref. 6, p. 2.
15. Popper, K., *Conjectures and Refutations: The growth of scientific knowledge*, 2nd edn, Harper & Row, New York, 1965.
16. Cleland, ref. 6, p. 3.
17. Cleland, ref. 4, p. 49.
18. Cleland, ref. 6, pp. 1–2.
19. Cleland, ref. 4, p. 51.
20. Cleland, ref. 4, p. 52.
21. Cleland, ref. 4, p. 54.
22. Cleland, ref. 4, p. 55.
23. Kuhn, T., *The Structure of Scientific Revolutions*, University of Chicago Press, Chicago, IL, 1962.
24. Cleland, ref. 4, p. 46.
25. Harrison, P., *The Fall of Man and the Foundations of Science*, Cambridge University Press, 2007; reviewed by Weinberger, L., *J. Creation* 24(3): 18–21, 2010.
26. Horton, R., Offline: what is medical’s 5 sigma? *The Lancet* 385(9976):1380, 2015 | DOI: 10.1016/S0140-6736(15)60696-1.
27. Moran, A. (Ed.), *Climate Change: The facts*, Stockade Books, Woodsville, NH, 2015.
28. Bergman, J., *Slaughter of the Dissidents*, Leafcutter Press, Green Forest, AR, 2008.
29. Ghosh, P., UCL says Tim Hunt will not be back after ‘sexist’ comments, *bbc.com*, 26 June 2015.
30. *The Economist*, How science goes wrong, *economist.com*, 21 October 2013.
31. Adler, ref. 12, p. 303.
32. Reed, J.K. and Klevberg, P., Beyond “origin and operation” science, part II: an alternative, *Creation Research Society Quarterly* 51(1):31–39, 2014.
33. Clark, G.H., *Historiography: Secular and religious*, The Trinity Foundation, Jefferson, MD, 1994.
34. Reed, J.K., Historiography and natural history, *Creation Research Society Quarterly* 37(3):160–175, 1999.
35. Laudan, L., The demise of the demarcation problem; in: Cohen, R.S. and Laudan, L. (Eds.), *Physics, Philosophy, and Psychoanalysis*, Reidel, Dordrecht, 1983; reprinted in *But Is It Science?* Prometheus Books, New York, pp. 337–350, 1996.
36. Bauer, H.H., *Scientific Literacy and the Myth of the Scientific Method*, Illini Books, Urbana-Champaign, IL, 1992.
37. Geisler, N.L., *Is Man the Measure? An evaluation of contemporary humanism*, Baker Book House, Grand Rapids, MI, 1983.
38. Geisler, N.L. and Anderson, J.K., *Origin Science: A proposal for the creation-evolution controversy*, Baker Book House, Grand Rapids, MI, 1987.
39. Thaxton, C.B., Bradley, W.L., and Olsen, R.L., *The Mystery of Life’s Origin: Reassessing current theories*, Philosophical Library, New York, 1984.
40. Meyer, S.C., The demarcation of science and religion, *discovery.org*, 2000.
41. The Enlightenment to 20th century attitude of optimism in scientific truth as the foundation of a new secular culture.
42. The recent (mid-20th century onwards) attitude of pessimism based on no absolutes in truth, ethics, or human hope.
43. Rose, E. (Fr Seraphim), *Nihilism: The root of the revolution of the modern age*, St. Herman Press, Platina, CA, 2009.
44. Angell, M., Drug companies and doctors: a story of corruption, *New York Review of Books*, nybooks.com, 15 January 2009.

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Darwinism fosters moral decline

Jerry Bergman

Darwinists have argued that the principle of 'survival of the fittest' has produced behaviour that we regard as immoral, such as rape and sexual promiscuity. Some Darwinists argue that evolution not only explains, but actually justifies, such behaviour. These are examples of how Darwinists attempt to explain almost everything, including morality, by appealing to evolution. As Kate Douglas concluded about evolution: "What is not in doubt is that our worst side will remain. Evolution has made us both altruistic and selfish—good and evil—and we cannot be otherwise. 'It's impossible for us.'"¹ This review documents how and why Darwinists have come to this conclusion.

A fundamental historical concern is the adverse effect of evolution on morals.² Orthodox evolution teaches that humans

"... are apes descended from other apes, and our closest cousin is the chimpanzee, whose ancestors diverged from our own several million years ago in Africa. These are indisputable facts. And rather than diminishing our humanity, they should produce satisfaction and wonder, for they connect us to all organisms, the living and the dead."³

University of Chicago Professor Jerry Coyne (figure 1) concluded that humans "descended from a hairy quadruped, furnished with a tail and pointed ears, probably arboreal in its habits."⁴ And many of those whom some refer to as hyperevolutionists believe that our morality, or lack thereof, is programmed into human nature by evolution.⁵ The many moral objections to human evolution are greater than to plant and animal evolution. The fact is, the belief that humans are just another animal does not, as Coyne admits, "produce satisfaction", but rather this view "has been anathema over most of the history of biology".⁴

Even Charles "Darwin knew full well the ire he would face by suggesting, as he firmly believed, that humans had evolved from" a lower ape-like species.⁴ For this reason, in

"*The Origin* he pussyfooted around the issue until more than a decade later in *The Descent of Man* (1871). Emboldened by his growing insight and conviction, and by the confidence gained from the rapid acceptance of his ideas, he finally made his views explicit. Mustering evidence from anatomy and behavior, Darwin asserted not only that humans had evolved from apelike creatures, but did so in Africa."⁴

Coyne adds that the more 'liberal' creationists believe that some species could have evolved from some other species but stresses that "*all* creationists draw the line at humans. The gap between us and other primates, they say, was unbridgeable by evolution, and must therefore have involved an act of special creation."⁴ The core of the opposition to evolution is *human evolution* because, he says, it does not seem difficult "to accept that mammals evolved from reptiles,

or land animals from fish".³ The problem is the evolutionary claim about humans that "like every other species, we too evolved from an ancestor that was very different". This is even though humans have

"... always perceived ourselves as somehow standing apart from the rest of nature. Encouraged by the religious belief that humans were the special object of creation, as well as by a natural solipsism that accompanies a self-conscious brain, we resist the evolutionary lesson that, like other animals, we are contingent products of the blind and mindless process of natural selection. And because of the hegemony of fundamentalist religion in the United States, this country has been among the most resistant to the fact of human evolution."³

Another example is the 1925 trial of high school teacher John Scopes, who was convicted of "violating Tennessee's Butler Act. Tellingly, this law didn't proscribe the teaching of evolution in general, but *only* the idea that *humans* have evolved [emphases added]."³ A major concern of the supporters of the Butler Act was the effect of human evolution on morals, specifically the implications of evolution for eugenics.⁶

Survival of the fittest

The cornerstone of evolution is the conclusion that 'survival of the fittest' in the struggle for existence eliminates the weak, allowing the strong, or the better adapted life forms, to thrive. This idea directly relates to *the number of offspring produced by the more fit in a given biological population*. In anthropologist Helen Fisher's words:

"When Darwin used the term 'survival of the fittest' he wasn't referring to your achievements or your endowments. He was counting your children. *You may have flat feet, rotten teeth, and terrible eyesight, but if you have living children you are what nature calls 'fit'. You have passed your genes to the next generation and in terms of survival you have won* [emphasis added]."⁷



Figure 1. Evolutionist professor of biology, Jerry Coyne, one of the leading advocates of the no free will view. He is also a leading critic of both creationism and Intelligent Design.

Furthermore, evolutionists teach that mating strategies have evolved to produce *more offspring*, and “most evolutionary theories of human mating have focused on the adaptive benefits of short-term mating for men”.⁸ This Darwinian conclusion has even been offered to justify sexual promiscuity and other behaviours that are often indulged in purely for selfish pleasure:

“Men who cheat on their spouses have long enjoyed an expedient explanation: Evolution made me do it. Many articles, especially in recent years, have explored the theory that men sleep around because the survival of the species has programmed them to seek fertile (and, conveniently, younger) wombs (figure 2).”⁹

In short, evolutionary theory teaches that promiscuity is wired into our genes because it results in greater reproductive success, which is a major driver of, and a result of, evolution.¹⁰ Cloud adds new research has shown that this is true not only for men but also for women. He asks if it is “true that evolution can cause a man to risk his marriage, how have eons of behavioral adaptation shaped women’s sexuality?” In his answer, he cites evolutionists who conclude that “evolutionary forces push women in their late 20s to mid-40s to be significantly more sexual than younger women And they are more willing than younger women to have casual sex, even one-night stands.”⁹

Easton hypothesized that the reason for this behaviour is because, as they age, natural selection has caused women to evolve a greater reproductive drive that is “designed to capitalize on their remaining fertility” causing an “increased willingness to engage in sex, including promiscuous sexual behavior”.¹¹

However, many problems exist with this evolutionary speculation, including that it assumes, based on evolution, that a woman’s sex drive is driven primarily by reproductive goals. In fact, most Western women today do not want to have more than one or two children, nor have children when they are older, both facts *prima facie* contradictions of this evolutionary prediction.¹²

Darwinism predicts immorality

The connection of Darwinian evolution to immorality was noted by a close friend of Darwin, Cambridge Professor Adam Sedgwick (figure 3). Sedgwick foresaw the cultural decline that evolution could cause in the future, once remarking that *The Origin of Species* was “a dish of rank materialism cleverly cooked and served up merely to make us independent of a Creator”.¹³ Sedgwick later added that, if the conclusions of Darwin’s book were widely accepted, humanity “would suffer a damage that might brutalize it, and sink the human race into a lower grade of degradation than any into which it has fallen since written records”.¹⁴ Some evolutionary theorists even argue that sexual coercion, and even rape, by males is predicted by evolution, noting:

“... adaptation underlies all human behavior. Thus, sexual coercion by men could either arise from a

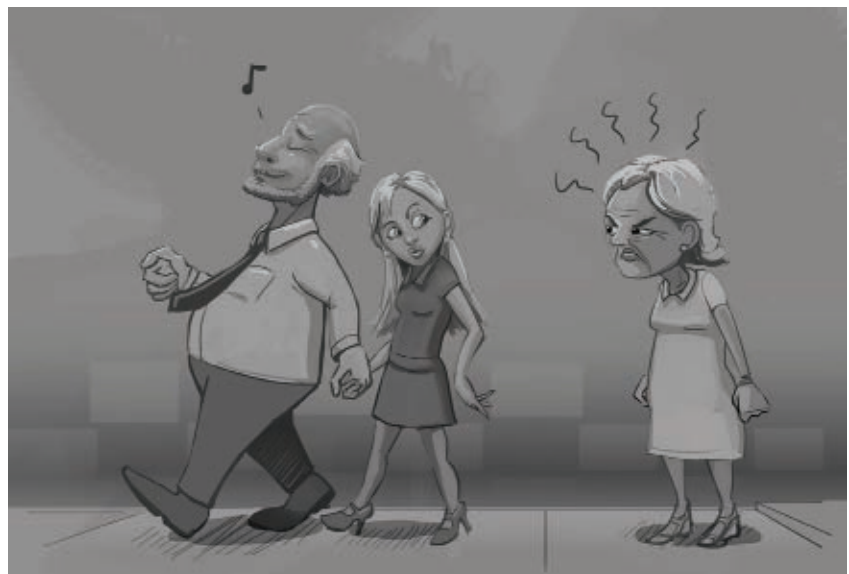


Figure 2. Many articles, especially in recent years, have explored the theory that men sleep around because the survival of the species has programmed them to seek fertile wombs.”⁹



Figure 3. Adam Sedgwick (1785–1873), a professor at Cambridge, was one of the founders of the modern field of geology. He never accepted Darwinism, and was active in speaking and writing against the evolutionary theories of his day. A special concern of his was the effect of evolutionism on morals.

rape—specific psychological adaptation—or it could be a side effect of a more general psychological adaptation not directly related to rape. Determining the specific environmental cues that men’s brains have been designed by selection to process may help us decide which of these rival explanations is correct.”¹⁵

They concluded that the newer research is “consistent with the rape-specific hypothesis, but this does not eliminate the side-effect hypothesis, which is likewise compatible with the findings, as well as with the further evidence that forced matings increased the fitness of ancestral males during human evolution.”¹⁵

Was rape hardwired by evolution?

Professors Thornhill and Palmer concluded that promiscuity, even rape, was biologically hardwired in humans by evolution.¹⁵ They reasoned that men who have a higher sex drive will on average have more children than those with a lower sex drive. As a result, evolution predicts that by having a greater number of offspring, the number of humans who possess a higher sex drive increased as males evolved. Evolutionary selection for this reason favoured “males who raped under some circumstances in the past.

And, therefore, there might be some aspects of male brains designed specifically to rape.”¹⁶

One justification for this view is the claim that rape is “common among birds and bees and is epidemic among mallard ducks”.¹⁷ An example used is that large groups of drakes sometimes descend on an unsuspecting female and rape her repeatedly, even causing death if the victim’s head is held under water for a long period of time. “When mallards pair up for breeding there often remain a number of unmated males.”

These unpaired males then “engage in what is apparently the next best strategy: raping someone else’s female”. Barash adds: “rape in humans is by no means [as] ... simple. ... Nevertheless mallard rape ... may have a degree of relevance to human behavior. Perhaps human rapists, in their own criminally misguided way, are doing the best they can to maximize their fitness.”¹⁷

Along the same line Thornhill writes: “In human evolutionary history, larger males were favored because of the increased likelihood of successful rape if they failed to compete successfully for parental resources.”¹⁸ Other scientists that come to similar conclusions include Dr Richard Alexander, a professor at the University of Michigan.

Dr Donald Symons, an anthropologist at the University of California, wrote a chapter in his book titled *Putting Woman in Her (Evolutionary) Place*, which argues along this line. Brown University Professor of Biology Anne Fausto-Sterling writes that although none of these evolutionists advocate condoning rape today, they have laid the foundation for societal changes in the future that may not be similarly constrained. Imagining that future, she writes:

“The headlines leap off the front pages of newspapers across the country. *Admitted rapist freed as jury buys biological defense!* A feature article says the following:

‘Admitted rapist Joe Smith was released today after a jury—in a landmark decision—bought the defense that sexual assault is biologically natural, and that some men—including Smith—have especially strong urges to rape. Since courts have not established procedures for confining “involuntary rapists”, Smith was freed.’”¹⁹

She added that precedents already exist for this court decision, including

“... women committing violent acts during their premenstruum have been absolved of legal responsibility after testimony that they suffered extremely from the Premenstrual Syndrome, a hormonal imbalance resulting in temporary insanity.”²⁰

In addition:

“... some convicted rapists have been offered the option of freedom conditional upon taking the

female hormone D.E.S. ... scientists trained in the field of [evolution offer] ... three different theories [for rape]... the ‘concealed ovulation’ theory, the ‘unsuccessful competitor’ theory, and the theory of ‘competition between the sexes’—all lead to similar conclusions.”²¹

She concluded:

“... although no man has yet beaten a rape rap by arguing that he carries ‘rapist genes’, some have received light sentences after agreeing to take female sex hormones, and some women have escaped criminal prosecution altogether by claiming to be victims of PMS.”²¹

Problems with the biological rape claim

The many problems with this view include the fact that men who rape are often sexually dysfunctional, or have erectile inadequacy, and many finish the rape by murdering the victim. In one study, 75% of rapists were diagnosed with a sexual dysfunction and 20% of the assaults were interrupted, the victim successfully resisted, or the rape was unsuccessful for other reasons.²² Furthermore, many male rapists choose males as victims or females too young to conceive. Also, for several reasons, pregnancies that result from rape are relatively rare.

Of the women who were forcibly raped, about one third were either too old or too young to become pregnant. Furthermore, a woman is capable of being fertilized only from three to, at most, five days out of a 30-day month. In addition, close to 20% of all women in the United States of childbearing age have been sterilized and about 15% of all young men are sterile.²³

In an average population, even if a female rape victim conceives, the miscarriage rate is about 15% and the incredible emotional trauma of rape significantly elevates the miscarriage rate even higher than exists in a normal pregnancy.²⁴ Also, in modern times, many women block any possible conception by birth control during much of their fertile lifespan. Even women in ancient times frequently resorted to abortifacients and, today, those who are raped often use the ‘morning-after pill’ to cause the abortion of any possible offspring.

Homes *et al.* found that the likelihood of rape-related pregnancy was less than 5% per rape among victims of reproductive age (from age 12 to 45).²⁵ Half of this 5% had an abortion, 11.8% had a spontaneous abortion, and only 32.2% were born alive.²⁶

In a study of women who became pregnant by rape, reasons for not carrying the child to term included family pressure, the belief that the birth would be a constant reminder of the rape trauma, and anger at or hate of the

baby’s father.²⁷ It is common to advise all rape victims if they miss their next regular period by more than a week to have a menstrual extraction or suction curettage.²⁸ Last, if a woman becomes pregnant following sexual assault, aside from DNA testing, which is often not done, it is frequently difficult to determine if the pregnancy was the result of the assault or a voluntary sexual encounter that occurred at about the same time as the rape occurred.²⁴

These factors all somewhat negate the supposed advantage of the putative genetic predisposition that causes males to become rapists today, and many of these factors have existed in the past, depending on the society and the time period. Evolutionist Marlene Zuk concluded from an extensive review of the common evolutionary arguments for favouring rape that, at the least, we evolved to be sexually promiscuous like our evolutionary relatives, such as the bonobo apes.²⁹ In short, Zuk concluded that it is more accurate to describe humans as peacefully promiscuous rather than violently so. This view is widely held by evolutionists today.

Polyamory

Central to evolution is the ability to produce a large number of progeny, because the more progeny, the more likely a greater number of offspring will, in turn, survive to reproduce. Thus, for this reason promiscuity was selected by evolution. Marc Hauser, Professor of Psychology and Biological Anthropology at Harvard University, in his book *Moral Minds: How Nature Designed Our Universal Sense of Right and Wrong*, promotes this position. He argues: “Some animals, in some conditions, are no different than some humans in some conditions: infanticide, siblicide, and even suicide are all options, supported by none other than Mother Nature.”³⁰

Hauser’s main argument is that humans “evolved a moral instinct” that was “designed by the blind hand of Darwinian selection millions of years before our species evolved; other parts were added or upgraded over the evolutionary history of our species.”³¹ In evolution, reproductive success determines biological traits, including our behaviours.

Leading evolutionist, Oxford University Professor Richard Dawkins (figure 4), argued that for these reasons we evolved a genetic drive for polyamory, which he described as having more than one romantic relationship at the same time, with all parties fully aware of the adulterous situation.³² Dawkins argued that “rather than the fanatically monogamous devotion” supported by Christianity, “some sort of polyamory is ... more rational” and natural because the drive to impregnate as many women as possible was produced by evolution.³³ He defined polyamory as the belief that one can simultaneously erotically love

“... several members of the opposite sex, just as one can love more than one wine, composer, book, or sport. We happily accept that we can love more than one child, parent, sibling, teacher, friend or pet. When you think of it like that, isn’t the total exclusiveness that we expect of spousal love positively weird? Yet it is what we expect, and it is what we set out to achieve” because of religious indoctrination [emphasis in original].”³⁴

Dawkins quoted evolutionist Helen Fisher who “has beautifully expressed the insanity of romantic love” from a Darwinian standpoint.³³ Dawkins admitted that “from a Darwinian point of view it is, no doubt, important to choose a good partner” to have a child with, but it is only important to stick with that partner “until the child is weaned” because evolution would select males who can spread their genes as far and wide as possible.³⁵

Other scholars promoting this view include James Rachels in his book *Created from Animals: The Moral Implications of Darwinism*. Rachels argues for the societal permissibility not only of abortion, but also voluntary euthanasia and infanticide for disabled babies, concluding that evolution makes the sanctity-of-life position untenable because evolution requires the weak to perish in order to allow for the numerical increase of evolutionarily superior



Figure 4. Professor Richard Dawkins, one of the most vocal critics of not only creationism and Intelligent Design but also theism. He is also one of the most well-known advocates of the no free will view.

persons.³⁶ The polyamory fad was popularized by O’Neill and O’Neill with their wildly popular book *Open Marriage* first published almost a half century ago, and still in print.³⁷

Sociologist Holger Lendt, in an article titled “Faithfulness does not exclude others”, writes that monogamy is outdated, and as evidence cites studies that claim most people today have extramarital affairs.³⁸ Lendt and others “strive to portray infidelity as acceptable behavior”.³⁹ She concluded: “The best thing is to adopt an attitude which allows a person to follow their heart.”⁴⁰

A best-selling book with the title in English *Loyalty is not a solution: A plea for more freedom in love* argues that promiscuity is ‘natural’.⁴¹ The fact is, unfaithfulness is a primary cause for divorce. This new worldview was influenced not only by Darwinism, but also by the decline of Christianity (which has itself had much to do with the influence of Darwinism).

At least a dozen books have been written on polyamory. One, by Dr Deborah M Anapol, who received her Ph.D. in Clinical Psychology from the University of Washington, became a best seller. She argues that one can successfully manage polyamorous relationships by dealing with jealousy, managing the transition from monogamy to non-monogamy, and the process of coming out.⁴² One reviewer, Patrick D. Goonan, wrote about this book:

“As a biologist/biochemist, I have read extensively on evolutionary biology and it is clear to me from the literature that we are hard-wired to pursue two mating strategies (long and short term) and that like other primates we have a strong tendency toward being promiscuous.”⁴³

The implications of evolution for immoral behaviour, as noted above, create major problems for Darwinism. As Professor Giberson notes, the fact that evolution is at least partly responsible for behaviour considered immoral by most people, such as rape, is

“... baggage carried by evolution [that] hampers its acceptance. Even if evolutionary theory were true, why would anyone *want* to believe a theory that rationalizes Nazism, infanticide, and rape? The theory’s supposed ‘explanation’ of these horrors represents for its detractors further evidence that the theory is really just a secular myth, undermining morality, condoning evil, and destroying religion.”⁴⁴

Many others attempt to deny the well-documented connection between evolution, the loss of Christianity in the West, and social problems such as promiscuity.

Evolutionist explanations used to justify immorality

Many historians believe that Darwinism destroyed the foundation of the Christian worldview, which ultimately

demolished the long-term purpose of life that Christianity has taught since Christ, namely to serve God and achieve everlasting life by faith and trust in the person and work of Jesus Christ. Darwinism taught that all life is the result of time and chance, the outworking of natural law and natural selection—not purpose and design as inherent in Christian teaching.

Motives to accept Darwinism

Professor Charles Steinmetz explained the relationship between atheistic Darwinism, God, and immortality in the following words:

“In the realm of science, all attempts to find any evidence of supernatural beings, of metaphysical conceptions, of God, immortality, infinity, etc., thus have failed, and if we are honest, we must confess that in science there exists no God, *no immortality*, no soul or mind as distinct from the body, but *scientifically God and immortality are illogical conceptions*. That is, science had inevitably ... become atheistic [emphases added].”⁴⁵

Aldous Huxley, considered a leader of modern thought and an intellectual of the highest rank, reportedly wrote:

“I wanted to believe the Darwinian idea ... not because I think there was enormous evidence for it, nor because I believe it had the full authority to give interpretation to my origins, but I chose to believe it because it delivered me from trying to find meaning and freed me to my own erotic passions.”⁴⁶

He added that he

“... had motives for not wanting the world to have a meaning; consequently [I] assumed that it had none, and was able without any difficulty to find satisfying reasons for this assumption ... The philosopher who finds no meaning in the world is ... also concerned to prove that there is no valid reason why he personally should not do as he wants to do.”⁴⁷

Huxley was forthright about one of these motives, stating that, for himself and for most of his contemporaries,

“... the philosophy of meaninglessness was essentially an instrument of liberation ... from a certain system of morality. We objected to the morality because it interfered with our sexual freedom. The supporters of these systems claimed that ... it embodied the meaning (a Christian meaning, they insisted) of the world. There was one admirably simple method of confuting these people and at the same time justifying ourselves in our political and erotic revolt: we would deny that the world had any meaning whatever.”⁴⁸

Other well-known early evolutionists expressed similar views, such as those involved in the Jezebel Club.⁴⁹

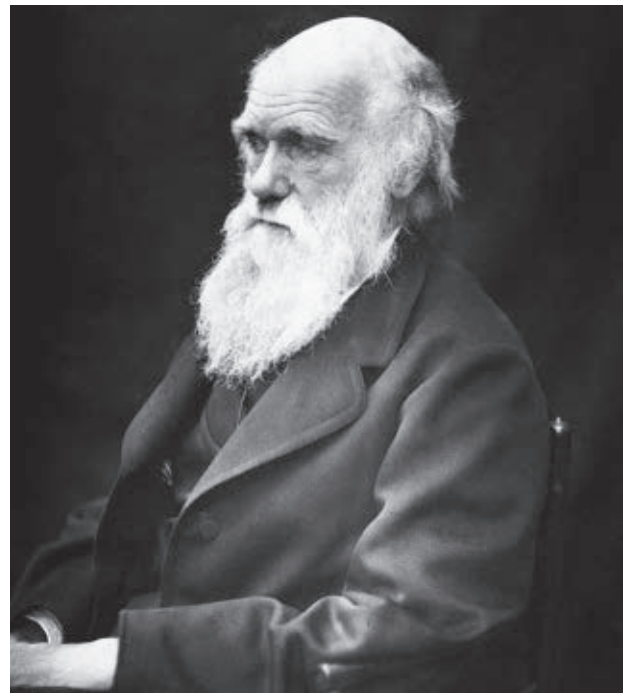


Figure 5. Darwin was not the first to propose the theory of biological evolution, but did more to spread it, and was more successful in doing so, than any other man. He also inspired many leading scientists to proselytize for the theory, and for these reasons the modern theory of evolution is often called Darwinism.

Michael Shermer added that “evolution dictates that we should maximize our reproductive success through cunning and deceit” but he admitted we can resist the drive that he claims was originally selected for by evolution.⁵⁰ Furthermore, University of Chicago evolutionary biologist Jerry Coyne claims evolutionary neurobiology has documented that human “brains are simply meat computers that, like real computers, are programmed by our genes and experiences to convert an array of inputs into a predetermined output.”⁵¹

For these reasons, Johns Hopkins University Professor (and later candidate for the US presidency) Ben Carson said that “the consequences of accepting evolutionary views of human origins” include

“... believing we are the product of random acts, [so] we eliminate morality and the basis of ethical behavior. For if there is no such thing as moral authority, you can do anything you want. You make everything relative, and there’s no reason for any of our higher values.”⁵²

As is clear from this review, Carson’s concern is valid. Coyne, in a study of evolution and morality, concluded that evolution clearly “contravenes many common religious beliefs”, especially those

“... dealing with morality, meaning, and human significance. And ... many churches and believers themselves ... [believe] that evolution violates the tenets of their faith, erodes morality, dispels the idea

of human purpose and meaning, and threatens the specialness of humans that is embodied in scripture.”⁵³

This Darwinian-based ‘morality’ has been used to help build a case to negate Judeo-Christian morality, especially since the 1960s, a trend that has increased markedly in the past twenty years. As a result,

“... applications of Darwinism to morality have re-emerged and influenced bioethics. Some bioethicists forthrightly argue that Darwinism undermines the Judeo-Christian sanctity-of-life ethic.”⁵⁴

As atheistic philosopher Joel Marks wrote:

“The religious fundamentalists are correct; without God there is no morality ... atheism implies amorality, and since I am an atheist, [to be logically consistent] I must therefore embrace amorality.”⁵⁵

This sentiment echoes the disturbing observation made by another famous atheist, Sigmund Freud, who wrote: “The moment a man questions the meaning and value of life, he is sick; since, objectively, neither has any existence.”⁵⁶

Clearly, these conclusions emanating from Darwinism are contrary to not only the Scriptures but also to the Judeo-Christian foundation of law and justice in Western society.

No free will?

Evolutionists argue that our brains are computers made out of meat that evolved by natural selection selecting against the less fit brains, and for the more fit brains. In addition, they concluded:

“... the experience of free will itself could be an illusion that evolution has given us to connect our thoughts, which stem from unconscious processes, and our actions, which also stem from unconscious process.”⁵¹

As University of Pennsylvania Professor Anthony Cashmore wrote:

“... a belief in free will is nothing other than a continuing belief in vitalism—something biologists proudly believe they discarded well over 100 years ago ... free will is an illusion.”⁵⁷

He adds that “belief in free will is similar to belief in magic.”⁵⁸

Christianity holds that an immaterial and immortal soul exists; evolutionism rejects belief in the soul, and concludes that all human behaviour is purely the action of genes and the environment, nothing more. Thus, belief in self-control must be rejected because the soul or ‘self’ does not exist; only the environment and genetic control exists.

In other words, as Cornell University Professor William Provine wrote, what we call *free will* does not exist, and we are at the mercy of our genetic heredity and our environment.⁵⁹ Cris Evatt claims that science has proven free will is a myth, and he lists a number of eminent scientists and intellectuals, including Albert Einstein, who have come

to the same conclusion.⁶⁰ Coyne wrote that we may believe that we have free will to make our own choices, for example what to have for breakfast,

“... but in reality ... whether to have eggs or pancakes, was determined long before you were aware of it — perhaps even before you woke up today. And your ‘will’ had no part in that decision. So it is with all of our other choices: not one of them results from a free and conscious decision on our part. There is no freedom of choice, no free will. And those New Year’s resolutions you made? You had no choice about making them, and you’ll have no choice about whether you keep them.”⁶¹

Even sexual promiscuity is ‘justified’ by many Darwinists claiming that this behaviour is driven by inescapable genetic predestination because humans are compelled by evolution to respond to our innate genetic sexual drives to be sexually unrestrained. Provine related that, after his belief in creation and the Creator was destroyed in college by Darwinian teaching, he became an atheist. He added that it was not long after that his

“... belief in human free will also disappeared under the influence of evolutionary biology. Despite the intense feeling of freedom of choice, humans are wholly determined by heredity and environment ... as are all biological organisms.”⁶²

Provine admits that “If humans had free will, it would be a very small nugget” but, nonetheless, he has “come to believe that human free will is nonexistent.”⁶² Furthermore, he concluded that belief in free will “causes inestimable harm” because acceptance of human free will ideas “makes possible inhuman punishment If humans have no free will, they deserve no punishment beyond rehabilitation, nor do they deserve credit for achievements.”⁶²

As far back as 1918, H. L. Mencken discussed the main reasons why many atheists reject free will, including:

“Free will, it appears, is still a Christian dogma. ... But outside the fold it is gradually falling into decay. Such men of science as George W. Crile and Jacques Loeb have dealt it staggering blows, and among laymen of inquiring mind it seems to be giving way to an apologetic sort of determinism The more the matter is examined the more the residuum of free will shrinks and shrinks, until in the end it is almost impossible to find it.”⁶³

In contrast to Provine’s, Coyne’s and Mencken’s view, the “Christian view sees human beings as having free will, so that they can choose to follow the teachings of Christ or not, as they wish. The notion that sinners might actually have no freedom of choice concerning their actions, but were sinning in obedience to inflexible laws, following a path to eternal damnation actually laid out by God in the beginning, simply could not be fitted into the established Christian worldview.”⁶⁴

The reason Coyne and others believe there is no free will is because to them all reality consists of matter only; neither God nor a soul exists, only the material world. Furthermore, all biological creatures are merely

“... collections of molecules that must obey the laws of physics. ... Those molecules, of course, also make up your brain — the organ that does the ‘choosing.’ And the neurons and molecules in your brain are the product of both your genes and your environment ... Memories, for example, are nothing more than structural and chemical changes in your brain cells. Everything that you think, say, or do, must come down to molecules and physics.”⁵¹

Coyne concluded that the evidence against free will is now unequivocal, writing that the

“... debate about free will, long the purview of philosophers alone, has been given new life by scientists, especially neuroscientists studying how the brain works. And what they’re finding supports the idea that free will is a complete illusion.”⁵¹

In Darwin’s universe there exists no good or evil

A purely materialistic universe excludes metaphysical realities, such as good and evil. In a *Scientific American* article, Dawkins related in blunt, raw language his honest and candid expression of his atheistic existential view of reality:

“The universe that we observe has precisely the properties we should expect if there is, at bottom, no design, no purpose, no evil and no good, nothing but pitiless indifference.”⁶⁵

He added that in

“... a universe of electrons and selfish genes, blind physical forces and genetic replication, some people are going to get hurt, other people are going to get lucky, and you won’t find any rhyme or reason in it, nor any justice.”⁶⁵

Dawkins concluded:

“... maximization of DNA survival is not a recipe for happiness. So long as DNA is passed on, it does not matter who or what gets hurt in the process. Genes don’t care about suffering, because they don’t care about anything.”⁶⁵

Coyne agrees with this conclusion, noting that the question of whether humans have

“... free will is not an arcane academic debate about philosophy, but a critical question whose answer affects us in many ways: how we assign moral responsibility, how we punish criminals, how we feel about our religion, and, most important, how we see ourselves—as autonomous or automatons.”⁵¹

Conclusions

As Professor Wiker concluded, “a whole host of moral horrors ... came packaged with Darwinism” and we have explored only a very few of them.⁶⁶ In conclusion, to “insist on strict Darwinism is to be a philosophical materialist” and the

“... mechanistic or reductionist idea of our origins leads straight to a mechanistic or reductionist view of ourselves. There is something of self-hate in the materialist approach. It depreciates the life of the mind and works of imagination and character. It demeans the richness and wonder of nature. It seems to make unnecessary further thinking about the mysteries of existence, of life and the universe. If one is gripped by the idea that we were made by chance (an unlovable deity) and are not intrinsically superior to amoebas (which by the same logic are not superior to bacteria or grains of sand), one is not prepared to cope with the responsibility of intelligence and power.”⁶⁷

The Darwinian view is in stark contrast to the Christian worldview, which teaches a set of values and goals that has, historically, motivated the establishment of a wide variety of humanitarian programs, from universities to hospitals.⁶⁸ As the late atheist philosopher J.L. Mackie concluded, if there are “intrinsically prescriptive objective values” (for which one would point to the moral values that created the humanitarian programs created by Christianity) “we have a defensible inductive argument from morality to the existence of a god”.⁶⁹ In the end, consistent with his atheism, Mackie rejected the existence of such objective values. He thus implied that we do not “have a defensible inductive argument from morality to the existence of a god”.

References

1. Douglas, K., Homo virtuosus? *New Scientist* 216(2890):42–45, 10 November 2012; p. 45.
2. De Tavernier, J., Morality and nature: evolutionary challenges to Christian ethics, *Zygon* 49(1):171–189, March 2014.
3. Coyne, J., *Why Evolution is True*, Viking, New York, p. 192, 2009.
4. Coyne, ref. 3, p. 193.
5. De Tavernier, ref. 2, p. 171.
6. Tontono, M., The Scopes trial revisited: Social Darwinism versus social gospel, *Science as Culture* 17(2):121–143, June 2008.
7. Fisher, H., *The Sex Contract: The evolution of human behavior*, Morrow, New York, p. 15, 1982.
8. Greiling, H. and Buss, D.M., Women’s sexual strategies: the hidden dimension of extra-pair mating, *Personality and Individual Differences* 28: 929–963, 2000; p. 929.
9. Cloud, J., The origin of cougar sex drives: a new evolutionary theory on why women’s libidos ramp up premenopause, *Time*, p. 49, 2 August 2010.
10. Bellamy, L. and Pomiankowski, A., Why promiscuity pays, *Nature* 479: 184–185, 10 November 2011; p. 184.
11. Easton, J.A., Confer, J.C., Goetz, C.D., and Buss, D.M., Personality and individual differences, *Personality and Individual Differences* 49:516–520, 2010; p. 516.

12. To be fair, a Darwinist might argue in defence that the drive programmed into us by selection may not be at the rational or conscious level, a caveat that needs to be borne in mind in other areas in this paper.
13. Barzun, J., *Darwin, Marx, Wagner*, Little Brown, Boston, MA, 1946.
14. Darwin, C., *The Correspondence of Charles Darwin: vol. 7, 1858–1859*, Cambridge University Press, Cambridge, UK, p. 397, 1991.
15. Thornhill, R. and Thornhill, N.W., The evolutionary psychology of men's coercive sexuality, *Behavioral & Brain Sciences* **15**(2):363, 1992.
16. West, J., *Darwin Day in America*, Intercollegiate Studies Institute, Wilmington, DE, p. xiii, 2007.
17. Barash, D., *The Whisperings Within: Evolution and the origin of human nature*, Harper and Row, New York, pp. 53–55, 1979.
18. Thornhill, R., Rape in panorpa scorpionflies and a general rape hypothesis, *Animal Behavior* **28**:57, 1980.
19. Fausto-Sterling, A., *Myths of Gender: Biological theories about women and men*, 2nd edn, Basic Books, New York, p. 156, 1992.
20. Fausto-Sterling, ref. 19, pp. 156–157.
21. Fausto-Sterling, ref. 19, p. 157.
22. Groth, N. and Burgess, A.W., Sexual dysfunction during rape, *New England J. Medicine* **297**:764–766, October 1977; p. 765.
23. The impulse to rape, if it were biologically conditioned, would not necessarily be a rational, conscious urge to procreate, therefore whether the woman is actually capable of conceiving or not, even if known to the perpetrator, would not then necessarily deter the action even if it was caused by some evolution-programmed 'hard wiring'. Similarly, if men were to find certain body shapes attractive which are associated with greater fertility, then whether or not this is the result of evolution or God's programming, one would not therefore expect that the same man would suddenly find a particular woman less attractive because he had been informed that she could not have children.
24. Mahkorn, S. and Dolan, W., Report of Sandra Mahkorn, MD, *Issues in Law and Medicine* **14**(4):433–441, Spring 1999.
25. Holmes, M.M., Resnick, H.S., Kilpatrick, D.G. and Best, C.L., Rape-related pregnancy estimates and descriptive characteristics from a national sample of women, *America J. Obstetrics and Gynecology* **175**(2):320–324, 1996.
26. Mahkorn, ref. 24, p. 435.
27. Mahkorn, S., Pregnancy and sexual assault; in: *Psychological Aspects of Abortion*, Mail, D. and Watts, W. (Eds.), University Publications of America, Washington D.C., pp. 53–72, 1979; p. 60.
28. Mahkorn, S. and Dolan, W., Sexual assault and pregnancy; in: Hilgers, T., Horan, D., and Mall, D., *New Perspectives on Human Abortion*, University Publications of America, Washington D.C., chap. 14, pp. 182–198, 1981; p. 187.
29. Zuk, M., *Paleofantasy: What evolution really tells us about sex, diet, and how we live*, Norton, New York, 2012.
30. Hauser, M.D., *Moral Minds: How nature designed our universal sense of right and wrong*, HarperCollins, New York, p. 36, 2006.
31. Hauser, ref. 30, p. xvii.
32. Vitagliano, E., The strange world of the polyamorist, *AFA J.* **35**(9):18–19, October 2011; p. 18.
33. Dawkins, R., *The God Delusion*, Houghton Mifflin, New York, p. 184, 2006.
34. Dawkins, ref. 33, pp. 184–185.
35. Dawkins, ref. 33, p. 185.
36. Rachels, J., *Created from Animals: The moral implications of Darwinism*, Oxford University Press, New York, 1990.
37. O'Neill, N. and O'Neill, G., *Open Marriage: A new lifestyle for couples*, M. Evans & Company, 1984.
38. Lieth, N., Call to Infidelity; in: *Midnight Call*, pp 21–22, June 2014; p. 21.
39. Quoted in Lieth, ref. 38, p. 21.
40. Lieth, ref. 38, p. 22.
41. Lendt, H. and Fischbach, L., *Treue ist auch keine Lösung: Ein Plädoyer für mehr Freiheit in der Liebe* (Loyalty is not a solution: A plea for more freedom in love), Pendo Verlag GmbH, Germany, 2011.
42. Anapol, D.M., *Polyamory: The New Love Without Limits: Secrets of Sustainable Intimate Relationships*, IntiNet Resource Center, Captain Cook, Hawaii, 1997.
43. tinyurl.com/l33fxmm
44. Giberson, K., *Saving Darwin: How to be a Christian and believe in evolution*, HarperOne, New York, p. 82, 2008.
45. Quoted in Hammond, J.W., *Charles Proteus Steinmetz: A biography*, The Century Company, New York, p. 456, 1924.
46. Quoted in Murray, A., *Grand Central Question: Answering the critical concerns of the major worldviews*, IVP Books, Downers Grove, IL, p. 21, 2014.
47. Huxley, A., *Ends and Means: An enquiry into the nature of ideals and into the methods employed for their realization*, Harper & Brothers, New York, pp. 312, 315, 1937.
48. Huxley, ref. 47, p. 273.
49. Marcy, M., *The Emperors Who Had No Clothes: Exposing the hidden roots of the evolutionary agenda*, CreateSpace, New York, p. 58, 2013.
50. Shermer, M., Lies we tell ourselves, *Scientific American* **306**(2):84, February 2012.
51. Coyne, J., Why you don't really have free will, *USA Today*, p. 3, 1 March 2012.
52. Quoted in Gallagher, J., Evolution? No. I don't have enough faith: a conversation with Dr Ben Carson, *Adventist Review* **181**(9):14–16, 26 February 2004; p. 14.
53. Coyne, ref. 51, p. 2.
54. Weikart, R., A history of the impact of Darwinism on Bioethics; in: Wheeler, M.R., *150 Years of Evolution: Darwin's impact on contemporary thought & culture*, San Diego University Press, San Diego, CA, p. 103, 2011.
55. Marks, J., An Amoral Manifesto (Part I), *Philosophy Now*, Issue 80, p. 1, August/September 2010.
56. Quoted in Rieff, P., *Freud, the Mind of the Moralist*, University Of Chicago Press, Chicago, IL, p. xix, 1979.
57. Cashmore, A., The Lucretian Serve: the biological basis of human behavior and the criminal justice system, *Proceedings of the National Academy of Science* **107**(10): 4499–4504, 9 March 2010; p. 4499.
58. Nair, P., Profile of Anthony R. Cashmore, *Proceedings of the National Academy of Science* **108**(2):443–445, 2011; p. 445.
59. Provine, W., No free will; in: Rossiter, M. (Ed.), *Catching Up With the Vision*, University of Chicago Press, Chicago, IL, pp. S117–S132, 1999; p. S117.
60. Evatt, C., The Myth of Free Will, *Café Essays*, Sausalito, CA, 2010.
61. Coyne, ref. 51, p. 4.
62. Provine, ref. 59, p. S123.
63. Mencken, H.L., *Damn! A Book of Calumny*, Philip Goodman Company, New York, pp. 91–94, 1918.
64. White, M. and Gribbin, J., *Stephen Hawking: A life in science*, Dutton, New York, 1992.
65. Dawkins, R., God's utility function, *Scientific American* **273**(5):80–85, November 1995; p. 85.
66. Wiker, B., *Catholic Church and Science: Answering the questions, exposing the myths*, Tan Books, Charlotte, NC, p. 71, 2011.
67. Wesson, R., *Beyond Natural Selection*, The MIT Press, Cambridge, MA, p. 308, 1994.
68. Hitchens, P., *The Rage Against God*, Zondervan, Grand Rapids, MI, 2010.
69. Mackie, J.L., *The Miracle of Theism: Arguments for and against the existence of God*, Clarendon, Oxford, pp. 115–116, 1982.

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Non-glacial landforms indicate thin Scandinavian and British-Irish Ice Sheets

Michael J. Oard

Just like the Laurentide Ice Sheet, the Scandinavian and British-Irish Ice Sheets were much thinner than the Antarctic Ice Sheet, which is used as an analogue for ice sheet thickness by uniformitarian scientists. This supports a higher sea level minimum in the creation science Ice Age model. The evidence for much thinner ice sheets in Europe includes tors, relatively thick soils, saprolite, blockfields, and slightly modified drainage features within the area covered by the ice sheets. These non-glacial landforms are even found at the proposed centre of the Scandinavian Ice Sheet over north-east Sweden that extends into northern Finland. To preserve such landforms, the ice sheet in these areas must have eroded the substrate very little over a few million years. Secular scientists are convinced the Scandinavian Ice Sheet was up to 3–4 km thick, and are forced to conclude these areas had been covered by cold-based ice, which causes little erosion. Nunataks are supposed to have protruded above the ice sheets, but uniformitarian scientists are forced to claim that the trimlines on nunataks are the boundary between warm ice below and cold ice above, instead of the boundary between ice below and no ice above. Some of the delicate pre-glacial features can potentially be explained by late Flood events and the unique post-Flood Ice Age.

Uniformitarian scientists commonly believe ice sheets during the Ice Age were the same thickness as the existing Antarctic Ice Sheet.^{1,2} These former ice sheets include the Laurentide Ice Sheet over central and eastern Canada and the adjacent United States, the Cordilleran Ice Sheet over western Canada and the adjacent United States, the British-Irish Ice Sheet over the United Kingdom, and the Scandinavian (Fennoscandian) Ice Sheet over northern continental Europe and north-west Asia. However, a great deal of evidence now suggests that the Laurentide Ice Sheet, the largest, was much thinner than the ice sheet in Antarctica.³ In this paper, further evidence will be presented that the Scandinavian and British-Irish Ice Sheets were also much thinner than Antarctica.

The Scandinavian Ice Sheet

The Scandinavian Ice sheet once covered northern continental Europe and extended into north-west Asia, including north-west Siberia (figure 1). The large islands north and north-east of Scandinavia, like Svalbard,⁴ were also glaciated. Researchers now believe the shallow Barents Sea and other seas were partly-to-totally glaciated as well.^{5–8}

Secular scientists claim there were 40–50 ice ages separated by interglacials in the Pleistocene⁹ because of their acceptance of the astronomical or Milankovitch theory of ice ages. (The claim of 40–50 ice ages comes mainly from oxygen isotope variations in deep-sea cores.) Secular scientists argue that, during each ice age, snow and ice began building up over the Scandinavian Mountains. This they also

argue started about 2.5–2.8 Ma,⁹ but it was not until about 1 Ma or later that some scientists think the snow and ice centre for each subsequent ice age spread out of the mountains into north-eastern Sweden, becoming 3–4 km thick.¹⁰ They also believe an ice divide extended eastward from north-east Sweden over the high terrain of northern Finland.¹¹

The last glaciation is thought to be one of the largest. Since each ice age apparently reworks and destroys much of the evidence of previous ice ages,¹⁰ we mostly only have terrestrial evidence for the last ice age. This argument, of course, does allow a scientist to add as many ice ages as desired or required. The last glacial maximum (LGM) is said to be about 20,000 years ago, with deglaciation thereafter to about 10,000 years ago.¹² These dates are based on the Swedish varve chronology,¹⁰ which is a problematic chronology.^{13,14}

The Ice Age or ages created fjords¹⁵ along the west coast of Norway (figure 2). On the eastern slopes of the Scandinavian Mountains are valleys and foothills called the piedmont. The valleys commonly contain deep, long lakes (figure 3). The piedmont lakes are almost as deep as the fjords and were carved the same way.¹⁰ Major end moraines lie just east of the mountains, while lateral moraines are common in the piedmont valleys. The estimated thickness and volume of the Scandinavian Ice Sheet at the LGM varies widely among researchers.¹⁶

Ice scouring is easily deduced where the Scandinavian Ice Sheet once was, as indicated by drumlins and other linear streamlined hills. These features are not correlated with bedrock lithology,¹⁷ indicating that they were carved by ice. These scoured features are now considered parts



Ice Sheets in Europe and Asia

Figure 1. Extent of ice sheets in Europe and north-west Asia (from *Life in the Great Ice Age*⁸⁹)



Figure 2. Geirangerfjord, Møre og Romsdal, Norway (Wikipedia)



Figure 3. A piedmont lake in north-east Sweden along the east slopes of the divide



Figure 4. The British-Irish Ice Sheet with the generalized flow patterns (arrow) (from Hughes *et al.*⁹⁰). The dashed line is its maximum extent, which was the edge of the continental shelf in the west.

of ice streams (a glacier that moves more than 1 km/yr¹⁸) commonly inferred for the ice sheets during the Ice Age.¹⁹

British-Irish Ice Sheet

The British-Irish Ice Sheet (figure 4) is now considered mostly separate from the Scandinavian Ice Sheet, divided by the Norwegian Channel off the west coast of Norway. It is thought to have once been connected to the Scandinavian Ice Sheet but disconnected during deglaciation.^{20,21} Until recently, the ice sheet was thought to have been much less extensive than shown in figure 4, but it is now argued that the British-Irish Ice Sheet covered all but southern England. Although the southern configuration of the ice sheet on Ireland is unknown and controversial,²² it is now believed that all of Ireland was glaciated, with the

presence of a secondary local ice cap in the south-west mountains (figure 4). There was also a separate ice cap on the Outer Hebrides and the Shetland Islands^{20,23,24} that merged with the ice moving west off north-west Scotland. This ice sheet is thought to have been two-thirds marine in the shallow seas with large ice streams. This was deduced from detailed features on land and on the ocean bottom.^{24,25}

Non-glacial landforms

A variety of non-glacial landforms, which formed either before glaciation or during an ‘interglacial’, and which did not form after glaciation, are found in previous Pleistocene glaciated areas. This suggests that little erosion occurred with the supposed succession of ice sheets. These landforms also cast doubt on much of the uniformitarian ice age paradigm, especially its long timescale of up to 2.6 Ma associated with the general start of the Pleistocene glacial/interglacial oscillations. These non-glacial landforms observed in the area covered by the Scandinavian and British-Irish Ice Sheets include tors, relatively thick soils, saprolite, blockfields, and little modification of pre-glacial drainage features.¹⁶ Nunataks also protruded above the ice until recently (discussed later).

Tors

A tor is “A high, isolated crag, pinnacle or rocky peak; or a pile of rocks much-jointed and usually granitic, exposed to intense weathering, and often assuming peculiar or fantastic shapes.”²⁶ Figure 5 shows a tor from non-glaciated Dartmoor, south-west UK. Tors are especially significant because they can be easily eroded by a glacier or ice sheet, and therefore are an indication that there was little erosion



Figure 5. Hey Tor on unglaciated Dartmoor, south-west UK (Herbythyme, Wikipedia Commons CC-BY-SA-4.0)

in the area. However, this conclusion could be somewhat modified if the tors were altered by erosion.²⁷ Hättestrand and Stroeve declare: “The implication is that the tors predate the oldest recorded ice flow in the area because they are not resistant to glacial erosion.”²⁸ Tors are mostly considered pre-glacial or non-glacial landforms.²⁹

Saprolite

A saprolite is “A soft, earthy, typically clay-rich, thoroughly decomposed rock, formed in place by chemical weathering.”³⁰ It is generally interpreted as weathered bedrock. Thick soils and saprolites are considered pre-glacial weathering features,^{25,27} since weathering and soil development in previously glaciated areas has been limited.³¹ Glaciers and ice sheets should easily erode soils and saprolites since modern glaciers are very erosive.³²

Blockfields

A blockfield is “A thin accumulation of usually angular blocks, with no fine sizes in the upper part, over solid or weathered bedrock, colluvium, or alluvium, without a cliff or ledge above as an apparent source.”³³ Blockfields are commonly found on low-relief mountaintops (figure 6) or plateaus.

The origin of blockfields is somewhat of a mystery, especially since they are neither forming today nor did they form after the ice left, with the exception of limestone blocks in the Canadian Arctic.^{27,34,35} Many researchers thought that blockfields formed before glaciation in a warm pre-Pleistocene climate.^{36,37} However, the consensus has shifted to viewing them as a result of a cold environment associated

with glaciation.^{35,38–41} Because occasional erratic boulders and meltwater channels are associated with blockfields, and there is no other evidence of glaciation, researchers now think ice actually covered the tops of the mountains but was cold-based and did not erode the blockfield. Cosmogenic isotopes indicate the blockfields survived at least the last ice age. Regardless, Goodfellow *et al.* think they may never have been eroded by glaciers: “Autochthonous blockfield mantles may indicate alpine surfaces that have not been glacially eroded.”⁴²

Nunataks

A nunatak is “An isolated hill, knob, ridge, or peak of bedrock that projects prominently above the surface of a glacier and is completely surrounded by glacier ice.”⁴³ The line on the nunatak, which shows erosion below and none above, is called the trimline. The existence of such features raises many questions with regard to both traditionally argued and the more recently argued cold ice sheets.

Survival of delicate landforms

Non-glacial landforms left by the Scandinavian and British-Irish Ice Sheets are found in abundance. These should have been easily eroded by glaciation.⁴⁴ Therefore, it is difficult for uniformitarian scientists to explain them with their proposed 40–50 ice ages.

Scandinavian Ice Sheet

Non-glacial features extensively cover the area of what was once the Scandinavian Ice Sheet, including where ice

was supposed to be thick over northern Sweden and Finland.^{19,45,46} For instance, tors are common in arctic Finland.⁴⁷ Tors and saprolites are common in areas of north-east Sweden, indicating glaciation had little effect.^{48,49} However, they are also adjacent to areas of significant glacial erosion, as shown by streamlined landforms suggestive of ice streams.^{19,25,49} In areas where tors and saprolites occur, pre-glacial drainage was hardly modified, as would be expected with so many glacial/interglacial cycles over 2.5 to 2.8 Ma. Even in glacially streamlined areas, planation surfaces and inselbergs that were only slightly planed, or not planed at all, still exist. This shows that erosion by the ice streams was insignificant. Although there are patches of thick till in



Figure 6. Blockfield on top of the glaciated Beartooth Mountains, north-central Wyoming and south-central Montana, USA



Figure 7. Planation surface with rounded inselbergs near Umeå, Sweden

northern and central Sweden,⁹ glacial till is generally thin.³¹ This is anomalous considering all the proposed glacial activity. The glacial transport of eroded rocks was also of short distances.⁵⁰ Indeed, Stroeven *et al.* exclaim:

“For a site near the centre of Fennoscandian glaciation, it is remarkable that the landscape is characterized by well-developed tors, boulder fields, and weathering mantles, and that the only traces of glaciation are till veneers and meltwater channels.”⁵¹

This is truly remarkable, and points more to a problem with the paradigm:

“Preservation of extensive and deep Neogene [late Cenozoic] weathering requires that cold-based patches develop in the same areas repeatedly and throughout the many cold stages of the late Pleistocene (Hall, 1986).”⁵²

When such contrived conditions are required to prop up the ‘multiple ice ages’ idea, it is no surprise that researchers admit that they do not understand glacial erosion and deposition in Scandinavia.⁹

Twenty percent of the mountains of northern Sweden that were repeatedly glaciated have non-glacial or pre-glacial landforms, including tors.³² Even heavily scoured areas show minimal erosion. Glacial erosion seems to be mainly linear, enlarging pre-glacial valleys into fjords and piedmont troughs in western Scandinavia.

Although some earlier researchers claimed deep erosion by ice sheets,^{53,54} many other researchers say that little glacial erosion has taken place.^{19,55} They point to saprolites with little glacial weathering that occur in central Sweden.⁵⁵ Planation surfaces with inselbergs are found not only in central Sweden but also over much of Scandinavia (figure 7)

at various altitudes.^{19,56} They indicate little glacial erosion.^{57,58}

The mountains of Norway also show little glacial erosion at the tops, while the main glacial erosion is linear in fjords.⁵⁹ Most landforms are pre-glacial.⁶⁰ The east slopes of the mountains of western Scandinavia also show little erosion.⁹

The British-Irish Ice Sheet

There is little glacial erosion in the North-West Highlands of northern Scotland (figure 8), as shown by tors and other non-glacial features.^{44,61,62} For instance, tors and blockfields are found in the Caithness Mountains of north-east Scotland.⁶³ Saprolites up to 60 m (200 ft) thick that are thought

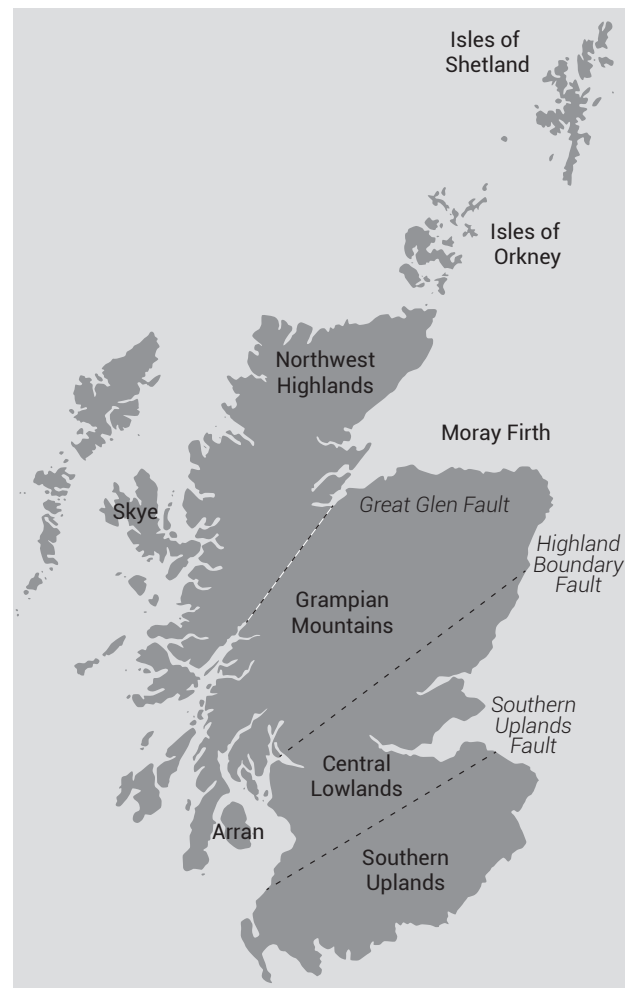


Figure 8. Relief map of Scotland with locations (from Rab-k, Wikipedia)

to represent a warm, humid climate survive in north-east Scotland.^{64,65} Blockfields and nunataks in the mountains and plateaus of north-west Scotland show little glaciation, although rare exotic boulders transported by ice occur on some mountains,^{62,66} which have caused researchers to suggest these high areas were covered by ‘cold-based’ ice.

Farther south, tors are common in the Grampian Mountains of central Scotland.⁴⁴ These mountains cover about half of Scotland. There are a lot of impressive tors up to 15 m (50 ft) high on the Cairngorms Mountains, part of the eastern Grampian Mountains. Some tors have been slightly modified by glacial flow.⁶⁷ Tors are found at mountaintops of Arran Island of west-central Scotland, as well as elsewhere in Scotland.⁶⁸

In the Southern Uplands of southern Scotland (figure 8), there is little evidence of glaciation in the Cheviot Mountains of south-east Scotland and adjacent England, as shown by areas of deep weathering and tors.⁶⁹ Evidence of intense erosion does occur at lower elevations around the Cheviot Mountains that are attributed to ice streams.

Ice moved radially from an ice cap over the Lake District of north-west England, which was thin with nunataks and blockfields protruding above the ice.⁷⁰ Farther south, deeply weathered material and several planation surfaces exist in Wales in areas that were glaciated.⁷¹ Tors are recorded in south-west Wales.⁶³ Ollier states that many pre-glacial Tertiary features are preserved in the British Isles.⁷²

There is little evidence of glaciation on the higher plateaus of Ireland, as shown by blockfields.⁶⁶ Deep weathering occurs in north-east Ireland that was not erased by glaciation.⁷³

Rescuing hypotheses unlikely

If scientists objectively investigated all this evidence, they would naturally conclude that the Scandinavian and British-Irish Ice Sheets were thin and that there was only one ice age. However, secular glaciologists assume there have been 50 ice ages of various intensities in regular succession beginning about 2.6 Ma⁷⁴ because they assume the astronomical theory of ice ages. In the Scandinavian Ice Sheet, the thickest ice sheets are believed to have built up to about 4 km over northern Sweden and Finland, although some researchers admit that they do not know its thickness and volume.⁷⁵ However, the astronomical theory is fraught with problems.^{76–79} The main difficulty is that the mechanism is weak, so researchers are constantly looking for a secondary mechanism to boost its strength.¹⁰

Cold-based ice sheets

Because of their uniformitarian assumptions, secular scientists are forced to assume that each ice age was

‘cold-based’ at the *same* locations where the non-glacial features are located.^{9,25,51} This is because the lower levels of a cold-based ice sheet do not move and are frozen to the bed. Without ice motion, delicate features such as non-glacial features would not be eroded. For instance, tors are claimed to have survived many such glacial cycles.⁸⁰

But how likely is it that ‘cold-based’ formation took place in the *same* areas up to 50 times? Although it is not expected that all these ice ages necessarily affected the same area (some were smaller and some were larger), even the smaller ice ages would have at least glaciated the mountains of Scandinavia. It is improbable that each ice age would be cold-based at the same location, especially since many uneroded areas are *adjacent* to areas scoured by ice streams.⁴⁹ Did ice streams always develop at the same locations? Although some ice streams are guided by bottom topography, some are random.⁸¹ These random ice streams would be expected to erode all non-glacial landforms if there were 50 ice ages. Ebert expresses great surprise:

“Scandinavia is unique in the respect that pre-Quaternary landforms were repeatedly covered by Quaternary ice sheets but often survived with different degrees of glacial modification.”⁸²

But even if there was just one ice age, it should erode these non-glacial landforms. As an ice sheet first develops and then melts back, it would *move* since it would have a surface slope (one of the variables in glacial movement). Cold-based areas should be rare early and late in an ice age, when the ice is relatively thin and summers relatively warm. And even cold-based ice can still move and be erosive.²⁷ Thus, delicate pre-glacial features should be erased with just one thick uniformitarian ice sheet.

Nunataks did not exist

Because secular scientists believe in thick ice sheets, they believe nunataks really did not protrude above the ice, but instead were covered by non-erosive, cold-based ice above the trimline.³⁸ Glaciologists had universally inferred trimlines to be indicators of maximum ice thickness—until recently. Models of glaciation resulting in thick ice sheets have many uniformitarian assumptions and indicate nunataks must have been glaciated.⁴⁰ However, cold-based ice forming on the tops of the mountains in Ireland, Scotland, England, and Scandinavia is implausible because the 40 or more ice ages most likely started in the mountains adjacent to the relatively warm North Atlantic Ocean. So surely the delicate mountaintop blockfields would have been eroded during mountain ice buildup.

The blockfields with erratic boulders and meltwater channels probably represent the height of the ice in the adjacent valley. Erratics and channels with no other signs of glaciation could form on low-relief mountaintops when

the top of the ice sheet melted. Nunataks with tors and blockfields still point to a thin ice cover in contrast to uniformitarian estimates.

The ice sheets had much less ice

All the evidence for the preservation of non-glacial features indicates that the Scandinavian and British-Irish Ice Sheets were much thinner than uniformitarian scientists believe. The ice was not thick enough to erode all the delicate surficial features. Ice was either non-existent (true nunataks) or shallow on the tops of the mountains, and confined mainly to the valleys. The ice centre was not over northern Sweden and Finland but over the western Scandinavian Mountains, as deduced from the terminal and lateral moraines in the piedmont valleys. The ice likely thinned considerably eastward into Sweden and Finland. The Scandinavian Ice Sheet was likely composed of multiple, thin domes, causing it to spread from these domes in ice streams, leaving behind uneroded non-glacial landforms between ice streams. Erosion was minimal even in areas scoured by ice streams. So, the volume of the Scandinavian Ice Sheet must have been much less than that suggested by secular scientists.

The evidence indicates that the main erosion was linear along the western edge of the ice sheet close to the warm North Atlantic Ocean and in valleys east of the mountains. The Scandinavian Mountains are where heavy snow would be expected. It is also where fjords or over-deepened valleys are located. Fjords likely represent a glacially over-deepened pre-glacial valley and are now inundated by the sea. (The over-deepening was likely caused by intense basal meltwater erosion since water pressure is proportional to ice thickness. This would explain why fjords are deepest close to the mountains and shallow seaward.)

The evidence for thin ice over eastern Sweden and Finland also conflicts with the deduction of thick ice based on isostatic uplift, as deduced by high shorelines and geodetic measurements showing an uplift of nearly 1 cm/yr in the Gulf of Bothnia. Isostasy is beyond the scope of this article, but still needs to be explained in light of the geomorphological evidence considered in this paper.

Support for the biblical Ice Age

The delicate pre-glacial features support a rapid post-Flood Ice Age caused by Noah's Flood.^{83,84} This Ice Age would have been roughly 700 years long with thinner ice sheets than what secular scientists believe. Some of the non-glacial landforms, such as valleys and pre-glacial drainage features, can be explained by erosion during the Recessive Stage of the Flood^{85,86} and post-Flood weathering during a

unique Ice Age. Tors would simply have formed somewhat analogously to inselbergs (an isolated hill rising from a plain) left from Flood runoff, but of much smaller height.

Other delicate features are more difficult to explain in the biblical framework, but do have potential solutions. For instance, soils can be either mud left over from the drainage of the Floodwater and/or weathering early in the Ice Age, especially at lower elevations. Post-Flood weathering would be rapid in the warm, humid climate early in the Ice Age—a result of warm oceans at mid and high latitudes. The warm onshore flow of moist air would especially bathe the United Kingdom and Scandinavia. Extensive volcanism after the Flood would cause acid rain, which would quickly weather surfaces that were not immediately covered by snow and ice. Therefore, the unique post-Flood climate can explain features like saprolites up to 60 m thick in north-east Scotland which are said to require a warm, humid climate.^{64,65}

Blockfields likely formed on exposed low-relief mountaintops or plateaus as the Ice Age developed. The rare erratics found in some blockfields^{62,66} indicate that in these cases, the blockfields were likely eventually covered by shallow snow or ice that was not erosive. It is likely that valley ice locally overtopped these blockfields but melted early, causing little mountaintop erosion. Upon deglaciation, meltwater would form rivers and lakes at the top of the ice sheets, as observed today in Greenland. Some of these lakes likely formed along the edge of nunataks because the ice adjacent to nunataks would melt faster due to the lower albedo of the rock. So, erratic boulders caught within the ice can be transported in icebergs by glaciofluvial and glaciolacustrine activity onto the blockfields.

An argument for a thick ice sheet made by secular scientists is that the ice sheets moved too far out onto the shallow continental shelf for them to be thin.⁶⁶ They claim this is proved by glacial moraines and other features on the ocean bottom. However, a relatively thin ice sheet, such as one that is 500–1,000 m thick at low elevation inland areas, should be able to spread ice far out onto the continental shelf. Several properties of the ice in the biblical model favour rapid motion, especially that post-Flood ice was 'warm' with volcanic particles. Together with the thinness of the ice sheet and its relative warmth, the ice would flow significantly faster and farther.⁸⁷ Given this situation, there would be many surges resulting in the top of the ice becoming low sloped, as has been abundantly deduced at the edge of former ice sheets, such as the Laurentide Ice Sheet in the US Midwest.⁸⁸

Evidence also points to only one, short Ice Age. It is difficult to conceive of these delicate features surviving even one short Ice Age, while two or more long ice ages would surely erode these features.

Discussion

Evidence has been presented in the form of delicate landscape and soil features that the Scandinavian and British-Irish Ice Sheets were thin. Such features are difficult to explain by 40–50 uniformitarian ice ages of various intensities, but do support one short Ice Age with relatively thin ice cover. Thin ice also means that sea level at glacial maximum was not nearly as low as uniformitarian estimates, which are about–120 m.

Because the post-Flood conditions included volcanism and warm oceans, the ice sheets had some unique features. For instance, the warm oceans would have delayed glacial onset on the western sides of continents. This would include the British-Irish Ice Sheet. This delay was a result of warm, onshore flow. Once the ocean temperatures dropped enough the ice sheet would have grown rapidly. Moreover, the warm air that flowed from the ocean brought very heavy precipitation, which explains why Ice Age hippo fossils are found in north-west Europe. Furthermore, storm tracks would be most common south of the ice sheets. Therefore, it is possible that the ice was relatively thick in the Scandinavian Mountains and along the southern edge of the Scandinavian and Laurentide Ice Sheets, but thinner inland.

A post-Flood Ice Age can also explain the ice domes over Keewatin and the Queen Elizabeth Islands in Canada, as well as the islands and seas north of Norway. In the uniformitarian paradigm, these areas should be polar deserts. However, a warm Arctic Ocean that had no sea ice until the end of the Ice Age would result in an onshore flow of moist air that would build up these ice domes.

The evidence also challenges the 2.6 Ma timescale of the Pleistocene with its 40–50 separate ice ages. Such development and melting of each ice sheet should destroy non-glacial landforms. One ice age with thin ice sheets suggests that the Pleistocene was around 700 years long, not 2.6 Ma.

References

- Bloom, A.L., Glacial-eustatic and isostatic controls of sea level; in: Turekian, K.K. (Ed.), *The Late Cenozoic Glacial Ages*, Yale University Press, New Haven, CT, p. 367, 1971.
- Christoffersen, P., Tulaczyk, S., Watturs, N.J., Peterson, J., Quintana-Krupinski, N., Clark, C.D., and Sjunneskog, C., Large subglacial lakes beneath the Laurentide Ice Sheet inferred from sedimentary sequences, *Geology* **36**(7):563–566, 2008.
- Oard, M.J., Evidence strongly suggests the Laurentide Ice Sheet was thin, *J. Creation* **30**(1):97–104, 2016.
- Landvik, J.Y., Brook, E.J., Gualtieri, L., Raisbeck, G., Salvigsen, O., and Yiou, F., Northwest Svalbard during the last glaciation: ice-free areas existed, *Geology* **31**(10): 905–908, 2003.
- Mangerud, J., Svendsen, J.I., and Astakhov, V.I., Age and extent of the Barents and Kara ice sheets in Northern Russia, *Boreas* **28**:46–80, 1999.
- Ottesen, D., Dowdeswell, J.A., and Rise, L., Submarine landforms and the reconstruction of fast-flowing ice streams within a large Quaternary ice sheet: the 2500-km-long Norwegian-Svalbard margin (57°–80°N), *GSA Bulletin* **117**(7/8): 1033–1050, 2005.
- Astakhov, V.I., Pleistocene glaciations of northern Russia—a modern view, *Boreas* **42**: 1–24, 2013.
- Andreassen, K., Winsborrow, M.C.M., and Bjarnadóttir, L.R., Ice stream retreat dynamics inferred from an assemblage of landforms in the northern Barents Sea, *Quaternary Science Reviews* **92**:246–257, 2014.
- Kleman, J., Stroeve, A.P., and Lundqvist, J., Patterns of Quaternary ice sheet erosion and deposition in Fennoscandia and a theoretical framework for explanation, *Geomorphology* **97**:73–90, 2008.
- Fredin, O., Glacial inception and Quaternary mountain glaciations in Fennoscandia, *Quaternary International* **95–96**:99–112, 2002.
- Hall, A.M., Sarala, P., and Ebert, K., Late Cenozoic deep weathering patterns on the Fennoscandian shield in northern Finland: a window on ice sheet bed conditions at the onset of Northern Hemisphere glaciation, *Geomorphology* **246**:472–488, 2015.
- Stroeve, A.P. *et al.*, Deglaciation of Fennoscandia, *Quaternary Science Reviews* **147**: 91–121, 2016.
- Oard, M.J., Varves—the first “absolute” chronology, part I: historical development and the question of annual deposition, *Creation Research Society Quarterly* **29**: 72–80, 1992.
- Oard, M.J., Varves—the first “absolute” chronology, part II: varve correlation and the post-glacial time scale, *Creation Research Society Quarterly* **29**:120–125, 1992.
- “A fjord is a long, narrow, winding, glacially-eroded inlet or arm of the sea, U-shaped and steep-walled, generally several hundred meters deep between high rocky cliffs or slopes along a mountainous coast”. Neuendorf, K.K., Mehl, Jr., J.P., and Jackson, J.A., *Glossary of Geology*, 5th edn, American Geological Institute, Alexandria, VA, p. 240, 2005.
- Hättestrand, C. and Stroeve, A.P., A relict landscape in the centre of Fennoscandian glaciation: geomorphological evidence of minimal Quaternary glacial erosion, *Geomorphology* **44**:127–143, 2002.
- Greenwood, S.L. and Clark, C.D., The sensitivity of subglacial bedform size and distribution to substrate lithological control, *Sedimentary Geology* **232**:130–144, 2010.
- Kleman, J. and Glasser, N.F., The subglacial thermal organization (STO) of ice sheets, *Quaternary Science Reviews* **26**:585–597, 2007.
- Hall, A.M., Ebert, K., and Hättestrand, C., Pre-glacial landforms inheritance in a glaciated shield landscape, *Geografiska Annaler* **95A**:33–49, 2012.
- Bradwell, T., *et al.*, The northern sector of the last British Ice Sheet: maximum extent and demise, *Earth-Science Reviews* **88**:207–226, 2008.
- Sejrup, H.P., Clark, C.D., and Hjelstuen, B.O., Rapid ice sheet retreat triggered by ice stream debuttressing: evidence from the North Sea, *Geology* **44**(5):355–358, 2016.
- Barth, A.M., Clark, P.U., Clark, J., McCabe, A.M., and Caffee, M., Last glacial maximum cirque glaciation in Ireland and implications for reconstructions of the Irish Ice Sheet, *Quaternary Science Reviews* **141**:85–93, 2016.
- Stone, J.O. and Ballantyne, C.K., Dimensions and deglacial chronology of the Outer Hebrides Ice Cap, northwest Scotland: implications of cosmic ray exposure dating, *J. Quaternary Science* **21**(1):75–84, 2006.
- Dove, D., Arosio, R., Finlayson, A., Bradwell, T., and Howe, J.A., Submarine glacial landforms record Late Pleistocene ice-sheet dynamics, Inner Hebrides, Scotland, *Quaternary Science Reviews* **123**:76–90, 2015.
- Krabbendam, M., Eyles, N., Putkinen, N., Bradwell, T., and Arbelaez-Moreno, L., Streamlined hard beds formed by palaeo-ice streams: a review, *Sedimentary Geology* **338**:24–50, 2016.
- Neuendorf, K.K., Mehl, Jr., J.P., and Jackson, J.A., *Glossary of Geology*, 5th edn, American Geological Institute, Alexandria, VA, p. 676, 2005.
- Goodfellow, B.W., Relict non-glacial surfaces in formerly glaciated landscapes, *Earth-Science Reviews* **80**:47–73, 2007.
- Hättestrand and Stroeve, ref. 16, p. 138.
- André, M.-F., The geomorphic impact of glaciers as indicated by tors in North Sweden (Aurivaara, 68° N), *Geomorphology* **57**:403–421, 2004.
- Neuendorf *et al.*, ref. 26, p. 574.
- Hall, A.M., Sarala, P., and Ebert, K., Late Cenozoic deep weathering patterns on the Fennoscandian shield in northern Finland: a window on ice sheet bed conditions at the onset of Northern Hemisphere glaciation, *Geomorphology* **246**:472–488, 2015.
- Stroeve, A.P., Harbor, J., Fabel, D., Kleman, J., Hättestrand, C., Elmore, D., Fink, D., and Fredin, O., Slow, patchy landscape evolution in northern Sweden despite repeated ice-sheet glaciation: in: Willett, S.D., Hovis, N., Brandon, M.T., and Fisher, D.M. (Eds.), *Tectonics, Climate, and Landscape Evolution*, GSA Special Paper 398, Geological Society of America, Boulder, CO., pp. 387–396, 2006.
- Neuendorf *et al.*, ref. 26, p. 73.
- Goodfellow, B.W., Fedin, O., Derron, M.-H., and Stroeve, A.P., Weathering processes and Quaternary origin of an alpine blockfield in Arctic Sweden, *Boreas* **38**: 379–398, 2008.

35. Ballantyne, C.K. and Stone, J.O., Trimlines, blockfields, and the vertical extent of the last ice sheet in southern Ireland, *Boreas* 44:277–287, 2015.
36. Paasche, Ø, Raukleiv, J., Dahl, S.O., and Linge, H., Weathering characteristics of arctic islands in northern Norway, *Geomorphology* 82:430–452, 2006.
37. Rea, B.R., Whalley, W.B., Rainey, M.M., and Gordon, J.E., Blockfields, old or new? Evidence and implications from some plateaus in northern Norway, *Geomorphology* 15: 109–121, 1996.
38. Ballantyne, C.K., A general model of autochthonous blockfield evolution, *Permafrost and Periglacial Processes* 21:289–300, 2010.
39. Goodfellow, B.W., A granulometry and secondary mineral fingerprint of chemical weathering in periglacial landscapes and its application to blockfield origins, *Quaternary Science Reviews* 57:121–135, 2012.
40. Goodfellow, B.W., Stroeven, A.P., Fabel, D., Fredin, O., Derron, M.-H., Bintanja, R., and Caffee, M.W., Arctic-alpine blockfields in the northern Swedish Scandes: late Quaternary—not Neogene, *Earth Surface Dynamics* 2:383–401, 2014.
41. Hopkinson, C. and Ballantyne, C.K., Age and origin of blockfields on Scottish mountains, *Scottish Geographical J.* 130(2):116–141, 2014.
42. Goodfellow *et al.*, ref. 40, p. 383.
43. Neuendorf *et al.*, ref. 26, p. 445.
44. Hall, A.M. and Sugden, D.E., Limited modification of mid-latitude landscapes by ice sheets: the case of northeast Scotland, *Earth Surface Processes and Landforms* 12:531–542, 1987.
45. Kleman, J., Preservation of landforms under ice sheets and ice caps, *Geomorphology* 9: 19–32, 1994.
46. Gilg, H.A., Hall, A.M., Ebert, K., and Fallick, A.E., Cool kaolins in Finland, *Palaeogeography, Palaeoclimatology, Palaeoecology* 392:454–462, 2013.
47. Darmody, R.G., Thorn, C.E., Seppälä, M., Campbell, S.W., Li, Y.K., and Harbor, J., Age and weathering status of granite tors in Arctic Finland (~68°N), *Geomorphology* 94:10–23, 2008.
48. Ebert, K. and Hättestrand, C., The impact of quaternary glaciations on inselbergs in northern Sweden, *Geomorphology* 115:56–66, 2010.
49. Ebert, K., Hall, A.M., Kleman, J., and Andersson, J., Unequal ice-sheet erosional impacts across low-relief shield terrain in northern Fennoscandia, *Geomorphology* 233: 64–74, 2015.
50. Sarapää, O. and Sarala, P., Rare earth element and gold exploration in glaciated terrain: example from the Mäkära area, northern Finland, *Geochemistry: Exploration, Environment, Analysis* 13:131–143, 2013.
51. Stroeven, A.P., Fabel, D., Hättestrand, C., and Harbor, J., A relict landscape in the centre of Fennoscandian glaciation: cosmogenic radionuclide evidence of tors preserved through multiple glacial cycles, *Geomorphology* 44:145, 2002.
52. Hall, *et al.*, ref. 11, p. 473.
53. White, W.A., Deep erosion by continental ice sheets, *GSA Bulletin* 83:1037–1056, 1972.
54. White, W.A., More on deep glacial erosion by continental ice sheets and their tongues of distributary ice, *Quaternary Research* 30:137–150, 1988.
55. Lundqvist, J., The Revsund area, central Jämtland—an example of preglacial weathering and landscape formation, *Geografiska Annaler* 70A:291–298, 1988.
56. Sugden, D.E., A case against deep erosion of shields by ice sheets, *Geology* 4: 580–582, 1976.
57. Ebert, K., Hall, A.M., and Hättestrand, C., Pre-glacial landforms on a glaciated shield: the inselberg plains of northern Sweden, *Norwegian J. Geology* 92:1–17, 2012.
58. Lidmar-Bergström, K., Ollier, C.D., and Sulebak, J.R., Landforms and uplift history of southern Norway, *Global and Planetary Change* 24:211–231, 2000.
59. Hall, A.M., Ebert, K., Kleman, J., Nesje, A., and Ottesen, D., Selective glacial erosion of the Norwegian passive margin, *Geology* 41(12):1203–1206, 2013.
60. Lidmar-Bergström, K., A long-term perspective on glacial erosion, *Earth Surface Processes and Landforms* 22:297–306, 1997.
61. Hall, A.M. and Mellor, A., The characteristics and significance of deep weathering in the Gaick area, Grampian Highlands, Scotland, *Geografiska Annaler* 70A: 309–314, 1988.
62. Clark, C.D., Evans, D.J.A., Khatwa, A., Bradwell, T., Jordan, C.J., Marsh, S.H., Mitchell, W.A., and Bateman, M.D., Map and GIS database of glacial landforms and features related to the last British Ice Sheet, *Boreas* 33:359–375, 2004.
63. Ballantyne, C.K., Extent and deglacial chronology of the last British-Irish Ice Sheet: implications of exposure dating using cosmogenic isotopes, *J. Quaternary Science* 25(4): 515–534, 2010.
64. Hall, A.M., Cenozoic weathering covers in Buchan, Scotland, and their significance, *Nature* 315:392–395, 1985.
65. Hall, A.M., Deep weathering patterns in north-east Scotland and their geomorphological significance, *Zeitschrift für Geomorphologie N.F.* 30(4): 407–422, 1986.
66. Fabel, D., Ballantyne, C.K., and Xu, S., Trimlines, blockfields, mountain-top erratics and the vertical dimensions of the last British-Irish Ice Sheet in NW Scotland, *Quaternary Science Reviews* 55:91–102, 2012.
67. Hall, A.M. and Phillips, W.M., Glacial modification of granite tors in the Cairngorms, Scotland, *J. Quaternary Science* 21(8):811–830, 2006.
68. Finlayson, A., Fabel, D., Bradwell, T., and Sugden, D., Growth and decay of a marine terminating sector of the last British-Irish Ice Sheet: a geomorphological reconstruction, *Quaternary Science Reviews* 83:28–45, 2014.
69. Mitchell, W.A., Quaternary geology of part of the Kale Water catchment, Western Cheviot Hills, southern Scotland, *Scottish J. Geology* 44(1):51–63, 2008.
70. Smith, A., *The Ice Age in the Lake District*, Rigg Side Publications, Grange Park, Keswick, Cumbria, UK, 2008.
71. Battiau-Queney, Y., The pre-glacial evolution of Wales, *Earth Surface Processes and Landforms* 9:229–252, 1984.
72. Ollier, C., *Ancient Landforms*, Belhaven Press, New York, p. 205, 1991.
73. Smith, B.J. and McAlister, J.J., Tertiary weathering environments and products in northeast Ireland; in: Gardiner, V. (Ed.), *International Geomorphology 1986, Part II*, John Wiley & Sons Ltd, New York, pp. 1,007–1,031, 1987.
74. Walker, M. and Lowe, J., Quaternary science 2007: a 50-year retrospective, *J. the Geological Society London* 164:1073–1092, 2007.
75. Kleman, J. and Glasser, N.F., The subglacial thermal organization (STO) of ice sheets, *Quaternary Science Reviews* 26:585–597, 2007.
76. Hebert, J., Circular reasoning in the dating of deep seafloor sediments and ice cores: the orbital tuning method, *Answers Research J.* 7:297–309, 2014.
77. Hebert, J., Should the “pacemaker of the ice ages” paper be retracted? Revisiting an iconic argument for Milankovitch climate forcing, part 1, *Answers Research J.* 9: 25–56, 2016.
78. Hebert, J., Revisiting an iconic argument for Milankovitch climate forcing: should the “pacemaker of the ice ages” paper be retracted? part 2, *Answers Research J.* 9: 131–147, 2016.
79. Reed, J.K. and Oard, M.J., Cyclostratigraphy, part I: What is cyclostratigraphy? *Creation Research Society Quarterly* 52(2):95–105, 2015.
80. Ebert, K., Terminology of long-term geomorphology: a Scandinavian perspective, *Progress in Physical Geography* 33(2):163–182, 2009.
81. Margold, M., Stokes, C.R., and Clark, C.D., Ice streams in the Laurentide Ice Sheet: identification, characteristics and comparison to modern ice sheets, *Earth-Science Reviews* 143:117–146, 2015.
82. Ebert, ref. 80, p. 163.
83. Oard, M.J., *Frozen in Time: Woolly mammoths, the Ice Age, and the biblical key to their secrets*, Master Books, Green Forest, AR, 2004.
84. Oard, M.J. (DVD), *The Great Ice Age: Evidence from the Flood for Its Quick Formation and Melting*, Awesome Science Media, Canby, OR, 2013.
85. Oard, M.J., *Flood by Design: Receding water shapes the earth's surface*, Master Books, Green Forest, AR, 2008.
86. Oard, M.J. (ebook), *Earth's Surface Shaped by Genesis Flood Runoff*, 2013, Michael. oards.net/GenesisFloodRunoff.htm.
87. Paterson, W.S.B., *The Physics of Glaciers*, 2nd edn, Pergamon Press, New York, 1981.
88. Oard, M.J., Evidence strongly suggests the Laurentide Ice Sheet was thin, *J. Creation* 30(1):97–104, 2016.
89. Oard, M.J. and Oard, B., *Life in the Great Ice Age*, Master Books, Green Forest, AR, 1993.
90. Hughes, A.L.C., Clark, C.D., and Jordan, C.J., Flow-pattern evolution of the last British Ice Sheet, *Quaternary Science Reviews* 89:148–168, 2014.

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Articles must be written clearly and concisely and should be focused on only one topic/subject. The most readable articles are those with an average sentence length of about 17 words, with one idea per sentence. Do not use too many big or extra words such as “in spite of the fact that” when “although” would do. Please use first person sparingly and do not use “this present writer”, which is verbose false modesty and ambiguous. Care with spelling is crucial, and British spelling generally applies. Personal invective or similar comments against others are not acceptable.

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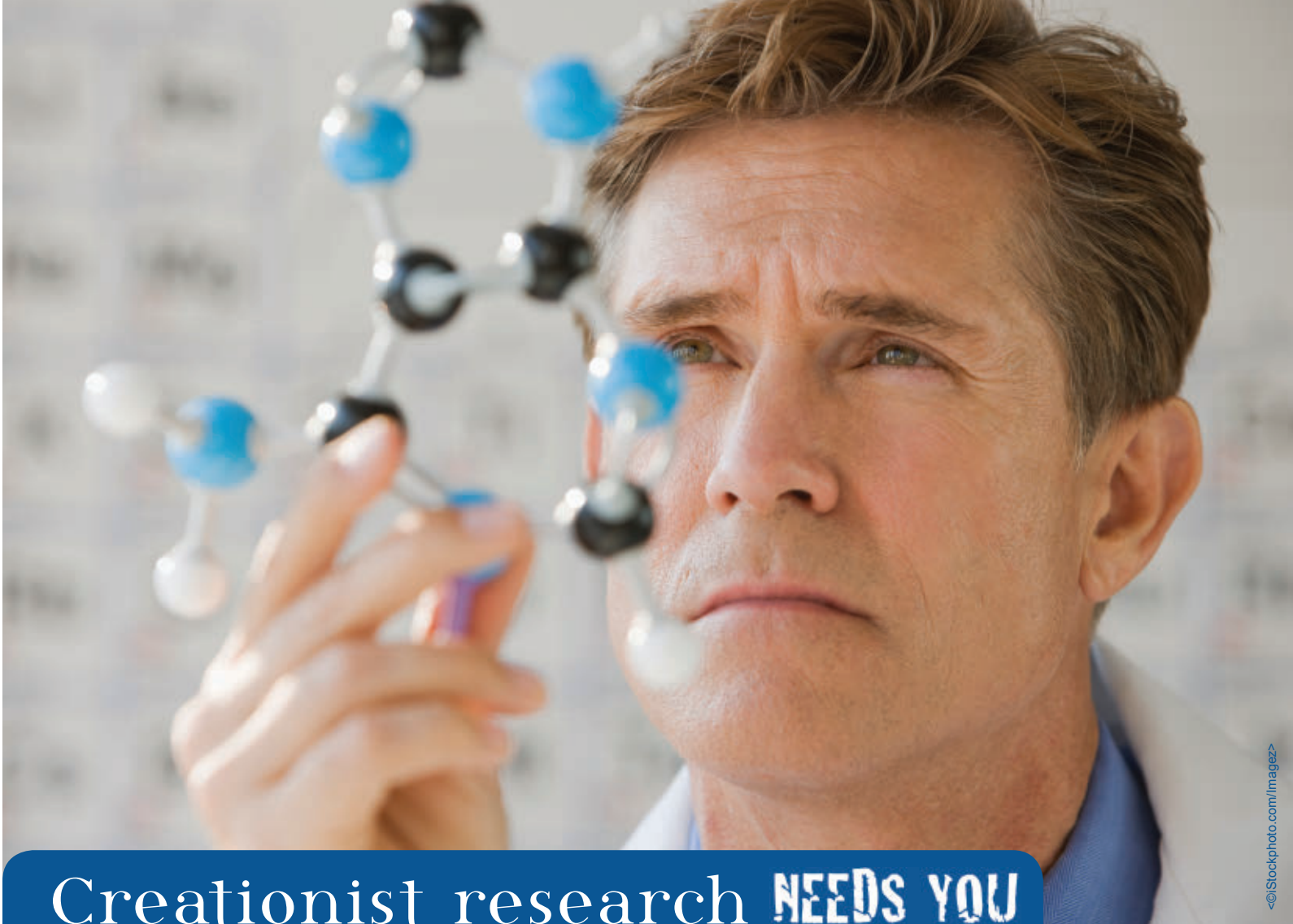
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